MACHINERY ISSUE

THE IRON TRADE REVIEW

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JUN 7 1918.
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AND
"OVER HERE"

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PITTSBURGH, PA.
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Engineering Directory, pages 192-193. Classified Advertisements, pages 203-224.

PREPAREDNESS

(1) Since the Koppers Company was acquired by American owners, January 1, 1915, it has placed in operation 16 by-product coke plants, totaling 1810 ovens and 30 benzol plants. Between now and September 1, 1918, it will put into operation seven (7) additional coke plants totaling 1490 ovens and ten (10) additional benzol plants, making a total of 3300 ovens and 40 benzol plants placed in operation in three years and eight months—an average of one benzol plant per month and one coke plant every two months since the first one was placed in operation.

(2) The total annual production of coke and by-products from these plants will be:

Coke	15,700,000 net tons
Tar	160,000,000 gallons
Sulphate of Ammonia	266,000 net tons
Benzol	54,000,000 gallons
Toluol	17,700,000 gallons
Surplus Gas	109 billion cubic feet

with a total annual value at present prices of approximately $187,000,000.

(3) Of this amount, the annual savings through the use of Koppers plants as compared with beehive ovens, totals $90,000,000. The performance of these plants that are now in operation is such as to demonstrate beyond dispute that Koppers' present practice leads the world in the manufacture of coke and its by-products.

(4) The Company is stronger today and is better prepared than ever before to execute rapidly a large volume of work.

H. KOPPERS COMPANY

PITTSBURGH, PA.

THE IRON TRADE REVIEW

Vol. LXII Cleveland, June 6, 1918 *No. 23*

Nonwar Demands Remain in Doubt

Molding of Plan to License Iron and Steel Distribution to Commercial Demands Indicates Belief Surplus Will Be Available in Time—May Production Establishes High Records—Manganese Ore Prices Fixed

HOW consumption of iron and steel not related to direct and indirect war requirements is to fare with regard to supplies still is an unsettled problem. The latest development along this line to come out of Washington is the understanding that a licensing system modeled after the English plan and covering business not concerned with war has been agreed upon by the joint committee of iron and steel producers and of representatives of the war industries board. This proposal soon will come before the war industries board for adoption. Consideration given to such a plan suggests that the belief is entertained there will be eventually some steel over and above essential needs. The quoted statement this week attributed to a prominent member of the war industries board that 20 per cent of capacity will be left for nonwar demands accents the fact that such a view is entertained in authoritative circles. This estimate would mean probably 7,000,000 tons of finished product annually. This statement grew out of the announcement of the steel director at New York last week that the present orders for the government and allies now on hand total 16,800,000 tons.

Survey Will Be Helpful

It now generally is admitted that the survey of demands undertaken by the joint committee representing the industry and the war industries board will fall short of its objects because of its inability to develop definite information regarding the government's steel requirements. At the same time the information accumulated from the canvass will serve to draw a closer discrimination between essential and nonessential demands. Relief is expressed that the government this week has begun the belated allocation of the material for the 100,000 cars recently awarded. A total of 922,110 tons is being placed with the mills.

No more licenses are to be issued by the war trade board against the imports of 12,000 tons of English ferromanganese which it recently was decided to permit. Import licenses will be issued only when the imports of manganese ore fall below a certain point. The war industries board has issued a fixed schedule of manganese ore prices based upon the recent market.

May Breaks All Records

Production statistics continue highly encouraging in view of the tremendous demands for iron and steel. May established many new high records. In pig iron the output of 3,448,207 tons was the largest of any May ever known and the second largest month in history, being exceeded only by October, 1916, with 3,508,180 tons: The gain over April was 174,852 tons. The number of active furnaces increased from 351 to 361. The lake ore movement of the past month also was the red letter period for any May. The movement of 8,792,231 tons was 2,508,619 tons greater than May, 1917. The season's movement to date is 2,532,957 tons ahead of last year. May plate output by the Carnegie Steel Co. set a new high record with 126,264 tons.

Speeding Up Iron Data

The tardiness of many pig iron consumers in making returns to the questionnaires which are to fix their status as producers of essentials has caused speeding up methods to be adopted. The furnaces have been formally advised by the pig iron committee that all users of iron, not reporting by June 6, will be considered in the nonessential class and their supplies will be regulated accordingly. Returns from consumers so far received show that a considerable amount of iron has been shipped and is obligated to go into nonessential channels. This condition makes it probable that a considerable tonnage of iron may be shifted into war consumption. Statistics on hand in the Pittsburgh district bring forth an estimate of 85 per cent of steelmaking iron and 65 per cent of foundry iron is being used for essential purposes.

JUNE 6, 1918

THE IRON TRADE REVIEW

A weekly publication devoted to the Iron, Steel, Foundry and Metalworking Industries.

Published Every Thursday by
THE PENTON PUBLISHING CO., Cleveland

BRANCH OFFICES

CHICAGO - - - - - 1147 Peoples Gas Bldg.
CINCINNATI - - - - - - 128 Opera Place
NEW YORK - - - - - - 508 West St. Bldg.
PHILADELPHIA - - - - 1316 Land Title Bldg.
PITTSBURGH - - - - - 2148-49 Oliver Bldg.
WASHINGTON, D. C. - - - 40 Metzerott Bldg.
BIRMINGHAM, ENG. - - - Prince's Chambers

Subscription, United States and Mexico, $4 per year. Canada, $6, and other Foreign Countries, $8 per year.

Entered at the Postoffice at Cleveland as Second Class Matter

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Where the Responsibility Rests

BRIGADIER GENERAL C. C. WILLIAMS, acting chief of ordnance, in addressing a recent meeting of ordnance officers at Washington, stated that production is now the most important factor in the departments share of winning the war. Matters of engineering design have been established, administration and control are in full swing, and the success of the ordnance program rests on the ability of the manufacturers to insure a steady flow of supplies to the camps and to the front.

These statements are no doubt true in some measure, but is the entire burden upon the manufacturer? Has the machinery of the ordnance department been so adjusted that there will be no hitch, nor wasteful friction at the many points of contact with the manufacturers? Consider the inspection division.

Expanded suddenly to many times in its original size, it is obvious that there was not time for minute examination of the personnel of the inspection division. The greater number of executive heads are men of wide industrial and engineering experience, and their work has been a credit to the department. However, the bullet-proof character of the inspector's job, and the fact that many were called for and many chosen, left the door open for some incompetents. W. H. Morgan, of the Morgan Engineering Co., Alliance, O., recently testified before the senate committee on military affairs. The fact that this manufacturer has filled a $15,000,000 contract for heavy ordnance ahead of the time limit specified, and at a saving to the government of over $800,000 on an improved wheel for gun carriages alone, removes any insinuation that a complaint is prompted by selfish considerations. Mr. Morgan complained that the inspectors employed by the department lacked technical training to make them competent. Foundries producing castings for ordnance work have had a similar experience. Through ignorance of modern methods, much time and material has been lost through the rejection of castings which could have been made satisfactory by the use of welding processes.

Another case of the hypercritical frame of mind, which sometimes marks incompetence and in other instances arises from hampered authority due to red tape, is given by a middle western firm. This manufacturer was constructing railway carriages for heavy ordnance. The drawings supplied were based on the French system, with all dimensions in metric measure. As no deviation was tolerated, a complete revision of production equipment was necessary.

The entire responsibility of ordnance production is by no means on the manufacturer. The structure of the department itself needs strengthening, as it is the steel framework upon which the production is built up. To continue this comparison, a revision of design is necessary in tension members, which constitute the inspection division. In some cases these members are obviously under weight and should be replaced by heavier shapes. In others the factor of safety allowed is entirely too great and a redesign is necessary. In any event the inspection division should be able to carry its full share of the burden.

Meeting the Call of War

A TRUE manifestation of the grim spirit of war that has gripped the important business interests of the country, was displayed at the annual general meeting of the American Iron and Steel institute at New York the past week. War and the things that count for victory occupied the thoughts and discussions of the meeting and crowded the private conversations. Consideration of ordinary business and matters of personal advantage were relegated to the level of secondary importance. The strong and virile patriotism of Mr. Schwab and the measured and far-sighted wisdom of Judge Gary together formed a background against which individual views were projected and joined in a swell of set and militant determination to carry the great cause through to a successful conclusion, no matter what the cost.

Judge Gary fitly summarized the present status of the iron and steel industry from a broad viewpoint of the future. He pointed out how war has changed the tendency toward criticism at Washington to a

desire for earnest co-operation with business. And business is meeting the new and friendly spirit with its best. Then he said: "We are being better prepared for the future and the iron and steel business will be on a better basis and a better footing than ever before; well prepared to succeed in the contest and the competition for international trade. If we win the war that will be worth something to us, if we do not have much in cash. If we lose the war, then it is not so important whether we have anything or not."

The sober tone of the meeting displayed no evidence of a light-hearted attitude toward the great burden and task that lies ahead. Rather it was the appraisal of a big job by business minds, neither too optimistic or unduly pessimistic but full of faith and Americanism.

The New York meeting showed clearly and why the iron and steel industry is giving the government 100 per cent co-operation as so generously acknowledged by Steel Director Replogle. The spirit of the meeting was the spirit of the industry. It reflected the present-day consecration of the effort of every manufacturer and the capacity of every plant to the higher cause of national necessity. It indicated that along with the country at large, the iron and steel industry gradually has grasped what the war means and will require and has settled down to meet every demand that may be made upon it.

Second Labor Problem of Industry

WHEN employes have enlisted or have been called into training by the operations of the draft, it has been the usual and proper thing for employers to extend their best wishes and the promise of their old jobs back again when they return from the war. If that has not been possible, they have been given to understand that places would be made for them in their old organizations. Their going presented one problem. Since such large numbers of industrial workers have been called to the colors, labor shortages have existed. In a way this problem has been met by enrolling of public service reserves, a proper allocation of workmen and the employment of women. Further drains upon the man power of the nation, however, will increase that problem and cause the adoption of other expediences to meet fresh labor shortages.

A greater problem perhaps will confront industry when these soldiers return. The problem of reclaiming them for and replacing them in industry will be particularly difficult, since large numbers of them will return, as they have to Canada, maimed, wounded, gassed and shell-shocked. No two will have precisely the same injury.

Several weeks ago, a transport docked at an Atlantic port and 50 American soldiers saw their homeland after more or less lengthy absences. During those absences they had fought the enemy and that fighting had left them in a more or less battered condition. During a recent week 148 sick and wounded soldiers of the American expeditionary force arrived at ports in this country. These variable demonstrations of war's ravages have served perhaps even more than reading the casualty lists in the newspapers to make America realize what war with Germany means. It did more than has anything else to remove the look of smug complacency from the faces of the stay-at-homes. Chief in importances, however, has been the result that industry has awakened to the realization that preparation must be made to receive such wounded and maimed soldiers. Consideration must be given to the restoration of their missing members, their shattered nervous systems, the use of paralyzed or semiparalyzed muscles.

While for a long time in the Creusot works of the Schneider brothers in France, such reconstruction work has been in operation and the equipment of that department of its welfare work is most complete, the eyes of industry have turned to a nation nearer home. Canada, from whom has gone forth approximately 500,000 volunteer soldiers, is already receiving droves of them back as casualties, and is leading the world in reclamation work. Committees of business men from the United States recently have visited Toronto which is the center of such work and have given intensive study to this problem. This means that tentative plans will soon be laid in this country, particularly by the iron and steel industry, to inaugurate as a part of its welfare work, some such reconstruction, reclamation and re-education methods as are followed and have proved so successful in the neighboring nation.

Already, much good work is being done by the Red Cross Institute for Crippled and Disabled Men in New York city. A letter it sent out recently reads in part as follows:

With thoughtful placement effort, many men can be employed on the basis of past experience. With disabled soldiers who have profited by training, the task should be even easier. The patriotic duty of employers is to study the jobs to determine what ones might be satisfactorily held by cripples; to give the cripples preference for these jobs; to consider thoughtfully the applications of disabled men for employment, bearing in mind the importance of utilizing labor which would otherwise be unproductive; to do the returned soldier the honor of offering him real employment, rather than proffering him the ignominy of a charity job.

If the employer will do this, it will be a great factor in making the complete elimination of the dependent cripple a real and inspiring possibility.

Returning soldiers must not be made to feel that they are subjects of charity, but in them must be inspired the feeling as it has been in Canada, that since they have done so much for the country, the country is back of them and is doing and will do all it can for them to help them find their useful place.

Iron and Steel Prices

Corrected to Wednesday Noon

SCRAP, WAREHOUSE AND IRON ORE PRICES ON PAGE 1464

PIG IRON

Bessemer, valley	$35.20
Bessemer, Pittsburgh	36.30
Basic, Pittsburgh	33.10
Basic, eastern Pa.	32.00
Basic, Buffalo	32.00
Malleable, Pittsburgh	34.60
Malleable, Chicago	33.50
Malleable, Philadelphia	34.00 to 37.50
Malleable, Buffalo	33.50

GOVERNMENT SCHEDULE

1.75 to 2.25 silicon (No. 2 foundry, No. 2 plain, and No. 3 southern), $33 furnace base.

2.25 to 2.75 silicon (No. 2X, No. 1 Northern foundry, and No. 2 southern), base plus 50c.

2.75 to 3.25 silicon (No. 1X, No. 2, soft), base plus $1.50.

Over 3.25 silicon, $34.50, plus $1.00 for each ½ per cent of silicon.

No. 1X, Phila.	35.25 to 35.50
No. 2 foundry, Pittsburgh	34.10
No. 2 foundry, Cleveland	34.10
No. 2 foundry, Ironton	33.00
No. 1 foundry, Chicago	33.50
No. 2 foundry, Chicago	33.00
No. 2X foundry, Phila.	34.25 to 34.50
No. 2X foundry, N. J. tide	34.25 to 34.50
No. 2X foundry, Buffalo	33.50
No. 2 plain, Philadelphia	33.75 to 34.00
No. 2 plain, N. J. tide	33.75 to 34.00
No. 2 southern Birmingham	33.00 to 33.50
No. 2 southern, Cincinnati	36.40
No. 2 southern, Chicago	37.50
No. 2 southern, Phila. del.	38.30 to 39.40
No. 2 southern, Cleveland	37.50
No. 2 southern, Boston	39.50
No. 2 southern, St. Louis	35.90
Virginia, No. 2X, furnace	33.50
Virginia, No. 2X, Phila.	36.77
Virginia, No. 2X, Jersey City	37.02
Virginia, No. 2X, Boston	37.27
Gray forge, Pittsburgh	32.95
Silveries, 8 per cent, furnace	45.50
Silveries, 8 per cent, Chicago	48.50
Low phos. standard, Phila.	55.00 to 56.00
Low phos. Lebanon, furnace	50.00 to 52.00
Low phos., Pittsburgh	53.00
Charcoal, Superior, Chicago	37.50
Charcoal, Superior, Buffalo	37.50
Charcoal, southern to 2 per cent silicon	43.00

COKE

(At the ovens)

Connellsville furnace	**$6.00**
Connellsville foundry	**7.00**
Pocahontas furnace	**8.00**
Pocahontas foundry	**8.00**
New River foundry	8.00
New River furnace	8.00
Wise county furnace	**6.00**
Wise county foundry	**7.00**

FERROALLOYS

Ferromanganese, 80 per cent delivered	$290.00
Ferromanganese, 70 per cent delivered	250.00
Spiegel, 16 per cent fur., spot	75.00 to 77.00
Spiegel, contracts, furnace	75.00
Ferrocarbon titanium, carloads, maker's plant	200.00
Ferrosilicon, 50 per cent, second quarter, Pitts.	150.00 to 160.00
Ferrosilicon, 50 per cent, Pitts., remainder of 1918	150.00 to 155.00
Bessemer ferrosilicon, 10 per cent.	55.00
Bessemer ferrosilicon, 11 per cent.	58.30
Bessemer ferrosilicon, 12 per cent.	61.60

Ferrosilicon prices at Ashland, Ky., Jackson and New Straitsville, O.

SEMIFINISHED MATERIAL

BILLETS AND BLOOMS

Open-hearth, Pittsburgh	$47.50
Open-hearth, Philadelphia	50.50
Open-hearth, Youngstown	47.50
Bessemer, Pittsburgh	47.50
Bessemer, Youngstown	47.50
Forging, Pittsburgh	60.00
Forging, Philadelphia	63.00

SHEET BARS

Open-hearth, Pittsburgh	$51.00
Open-hearth, Youngstown	51.00
Bessemer, Pittsburgh	51.00
Bessemer, Youngstown	51.00

SLABS

Pittsburgh and Youngstown.	$50.00

WIRE RODS AND SKELP

Wire rods, Pittsburgh	$57.00
Grooved skelp, Pittsburgh	2.90c
Sheared skelp, Pittsburgh	3.25c

SHAPES, PLATES AND BARS

(In cents per pound)

Structural shapes, Pitts.	3.00c
Structural shapes, Phila.	3.185c
Structural shapes, N. Y.	3.195c
Structural shapes, Chgo.	3.00c
Tank plates, Chicago	3.25c
Tank plates, Pittsburgh	3.25c
Tank plates, Philadelphia	3.435c
Tank plates, New York	3.445c
Bars, soft steel, Pittsburgh	2.90c
Bars, soft steel, Chicago	2.90c
Bars, soft steel, New York	3.095c
Bars, soft steel, Phila.	3.085c
Bar iron, Chicago	3.50c
Bar iron, Phila.	3.50c to 3.685c
Bar iron, Cleveland	3.64c to 3.70c
Bar iron, New York	3.50c to 3.695c
Bar iron, Pittsburgh	3.50c
Hard steel bars ,Chicago	3.00c

RAILS, TRACK MATERIAL

Angle bars, Pittsburgh base.	3.25c
Angle bars, Chicago base	3.25c
Standard bessemer rails, mill	$55.00
Stand. open-hearth rails, mill	57.00
Light rails, 25 to 45, mill	3.00c
Relaying rails, light, St. L.	60.00 to 67.00
Spikes, railroad, Pitts.	3.90c
Track bolts, Pittsburgh	4.90c
Track bolts, Chicago	5.115c
Tie plates, Chicago	3.25c

WIRE PRODUCTS

(Per 100 lbs. to jobbers; retailers 5c more)

Wire nails, Pittsburgh	$3.50
Coated nails, Pittsburgh	3.45
Plain wire, Pittsburgh	3.25
Galvanized wire, Pittsburgh.	3.95
Polished staples, Pittsburgh.	3.65
Galvanized staples, Pbgh.	4.35
Barb wire, painted, Pitts.	3.65
Barb wire, galvanized, Pitts.	4.35
Cut nails, Pittsburgh	4.00

CHAIN, PILING, STRIP STEEL

(In cents per pound)

Chain, ⅜ in. proof coil, Pitts. 8.00c

Sheet piling, base, Pitts. 4.00c to 5.00c

Cold rolled strip steel, hard coils, 1½ inches and wider by 0.100 inch and heavier, base per 100 pounds, 6.50c.

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SHEETS

(In cents per pound)

SHEET MILL BLACK

No. 28, open-hearth, Pitts.	5.00c
No. 28, bessemer, Pitts.	5.00c
No. 28, open-hearth, Chi.	5.215c

TIN MILL BLACK

No. 28, open-hearth, Pitts.	5.00c
No. 28, bessemer, Pitts.	5.00c

GALVANIZED

No. 28, open-hearth, Pitts.	6.25c
No. 28, bessemer, Pitts.	6.25c
No. 28, open-hearth, Chi.	6.465c

BLUE ANNEALED

No. 10, open-hearth, Pitts.	4.25c
No. 10, bessemer, Pitts.	4.25c
No. 10, open-hearth, Chi.	4.465c
No. 10, open-hearth, Phila.	4.435c

TIN PLATE

(Per 100 lb. box)

Tin plate, coke base, Pitts.	$7.75

IRON AND STEEL PIPE

Base Pittsburgh

Base, Pittsburgh	Black Per cent off	Galv. Per cent off
¼ to 3 in., butt, steel	51	37½
¼ to 3 in., butt, iron	33	17

BOILER TUBES

Steel, 3½ to 4½ inches, l. c. l.	30
Iron, 3½ to 4½ inches, c. l.	12½

CAST IRON WATER PIPE

(Class B Pipe)

Class A pipe is $1 higher than Class B.

Four-inch, Chicago	63.35
Six-inch and over, Chicago	60.35
Four-inch, New York	64.35
Six-inch and over, N. Y.	61.35
Four-inch, Birmingham	58.00
Six-in. and over, Birmingham	55.00

HOOPS, BANDS, SHAFTING

Hoops, Pittsburgh	**3.50c**
Bands, Pittsburgh	3.50c
Hot rolled strip steel, Pitts.	3.50c
Shafting, Pitts., carloads	17 off to list
Cotton ties, May, per bundle	**$1.91**

RIVETS

Structural rivets, Pittsburgh.	4.40c
Boiler rivets, Pittsburgh	4.50c
Rivets ⅞ in. & small., Pitts.	50 and 10 off

NUTS AND BOLTS

(Delivered within 20-cent freight radius)

CARRIAGE BOLTS

(⅜ x 6 inches, smaller and shorter)

Rolled thread	50–5 off
Cut thread	40–10–5 off
Larger and longer	40 off

MACHINE BOLTS

(⅜ x 4 inches, hot pressed nuts)

Rolled thread	50–10–5 off
Cut thread	50–5 off
Larger and longer	40–10 off
Cold pressed semifinished hexagon nuts ⅝ in. and larger	60–10–10 off
Cold pressed semifinished hexagon nuts ⅞ in. and smaller	70–5 off
Gimlet and cone point lag screws	50–10 off

NUTS

Hot pressed, square blank	2.50c off
Hot pressed, square tapped	2.30c off
Hot pressed, hexagon blank	2.30c off
Hot pressed, hexagon tapped	2.10c off
Cold pressed, square blank	2.25c off
Cold pressed, square tapped	2.00c off
Cold pressed, hexagon blank	2.25c off
Cold pressed, hexagon tapped	2.00c off

Prices Present and Past

(Yesterday, a month ago, three months ago and a year ago)

Quotation, on leading products June 5, average for May, 1918, average for March, 1918, and average for June, 1917. Prices are those ruling in the largest percentage of sales at the dates named.

	Prices June 5, 1918	Average prices May, 1918	March, 1918	June, 1917
Bessemer pig iron, Pittsburgh..	$36.30	$36.15	$37.25	$55.20
Basic pig iron, Pittsburgh.....	33.10	32.95	33.95	50.20
*No. 2 Foundry pig iron, Pitts.	34.10	33.95	33.95	51.02
*No. 2, Foundry pig iron, Chi.	33.00	32.00	33.00	51.00
Lake Superior charcoal, Chicago	37.50	37.50	37.50	51.80
Malleable, valley	33.50	33.50	33.50	50.07
Malleable, Chicago	33.50	33.50	33.50	50.50
**Southern, No. 2, Birmingham.	33.50	33.50	33.50	35.75
*Southern Ohio No. 2, Ironton	33.00	33.00	33.00	38.60
Basic, eastern Pa.....	32.00	32.00	33.00	46.37
**No. 2X Virginia, furnace....	33.50	33.50	33.50	46.50
**No. 2X foundry, Philadelphia	34.25	34.25	34.25	47.50
Ferromanganese, 70%, delivered	250.00	250.00	250.00	431.25
Bessemer billets, Pittsburgh....	47.50	47.50	47.50	93.75
Bessemer sheet bars, Pittsburgh	51.00	51.00	51.00	101.25
Open-hearth sheet bars, Pitts..	51.00	51.00	51.00	101.25
Open-hearth billets, Pitts.....	47.50	47.50	47.50	93.75
Steel bars, Pittsburgh.....	2.90	2.90	2.90	3.62
Steel bars, Chicago.....	2.90	2.90	2.90	4.50
Iron bars, Philadelphia.....	3.50	3.50	3.50	4.26

	Prices June 5, 1918	Average prices May, 1918	March, 1918	June, 1917
Iron bars, Cleveland.....	$3.64	3.64	3.64	3.50
Iron bars, Chicago mill.....	3.50	3.50	3.50	4.00
Beams, Chicago	3.00	3.00	3.00	4.63
Beams, Pittsburgh	3.00	3.00	3.00	4.00
Beams, Philadelphia	3.185	3.18	3.18	4.66
Tank plates, Pittsburgh.....	3.25	3.25	3.25	4.50
Tank plates, Chicago.....	3.25	3.25	3.25	7.92
Tank plates, Philadelphia.....	3.435	3.43	3.43	9.66
Sheets, blk., No. 28, Pitts.....	5.00	5.00	5.00	8.13
Sheets, blue anld., No. 10, Pitts.	4.25	4.25	4.25	7.57
Sheets, galv., No. 28, Pitts....	6.25	6.25	6.25	9.95
Wire nails, Pittsburgh.....	3.50	3.50	3.50	3.62
Connellsville furnace coke.....	6.00	6.00	6.00	11.12
Connellsville foundry coke.....	7.00	7.00	7.00	11.18
Heavy melting steel, Pitts.....	29.00	29.00	30.00	40.00
Heavy melting steel, eastern Pa.	28.50	28.50	29.50	36.62
Heavy melting steel, Chicago..	29.00	28.90	30.00	37.00
No. 1 wrought, eastern Pa....	34.00	34.00	35.00	47.87
No. 1 wrought, Chicago.....	33.50	33.50	35.00	46.75
Rerolling rails, Chicago.....	34.00	34.00	35.00	46.00

*1.75 to 2.25 silicon. **2.25 to 2.75 silicon.

(For Additional Prices See Page 1464)

Insist Users Make Quick Returns

Pig Iron Committee Advises Furnaces to Consider Consumers Not Reporting by June 6 in Nonessential Class—Reports Show Much Iron Going Into Non-war Work—Government Favors Covered Consumers

Cleveland, June 4.—More vigorous methods to get in the returns from consumers of pig iron to the questionnaire showing the extent to which they are occupied by essential work have been adopted by the committee on pig iron, iron ore and lake transportation. In a new letter by Chairman H. G. Dalton to the furnaces, it is declared that consumers who have not made a return by June 6, will be considered the nonessential class and will be entitled to receive pig iron only in accordance with that class until they establish their status otherwise. The letter to the furnaces dated May 28 follows:

Gentlemen:—

While we appreciate in asking that the blanks sent you requesting certain data in regard to pig iron matters entails considerable work and will take some time to complete, still we are hopeful that we might get the reports in within two weeks. This time has elapsed and very few of the reports have been received so far.

I write to urge you to give special attention to sending them in with as little further delay as is possible. It is very important to the department of steel supply that we furnish this information to them at the earliest date we can. I have no doubt that you are being delayed in your reports awaiting the figures you have requested from your customers; possibly they do not appreciate the importance of prompt reply.

Might I ask if you would again communicate with such of your customers, who have not yet made their reports to you, requesting prompt compliance and I should think you might suggest in the letter that not hearing from them by a certain date, say June 6th, you will consider that they are on nongovernmental work and that you will make your report to the government and this committee on such basis.

I believe if there is further delay in hearing from them that the department of steel supply will support us in our contention that their work must be nonessential; otherwise they would be more interested in making their reports promptly.

Trusting that you will realize the importance of hurrying these reports along and, therefore, will give it your first attention, I remain,

Sincerely yours,
Chairman, Pig Iron, Iron Ore and Lake Transportation Committee.

Allocation requests to the committee continue to increase. The largest of the week calls for 17,500 tons of basic and 8400 tons of bessemer for June-December delivery to the Crucible Steel Co. for general steel requirements. Other ordnance requirements include 1500 tons of June-August bessemer for a Braddock, Pa., user; 2400 tons of June-December foundry for one Wilmington, Del., consumer, and 1860 tons of foundry for the same delivery to another Wilmington interest; and 500 tons of prompt foundry for a Pittsburgh plant. For the Fleet corporation 2500 tons of foundry for June-November will go to a Plattsburg, N. Y., consumer and 500 tons of early No. 2 to a Baltimore shop. The railroads now are considered a government department for the allocation of material and the American Railway association will distribute such supplies. A lot of 900 tons of bessemer was allocated to the association this week.

Unfilled Demands Accumulate

Boston, June 3.—There is still a large demand for pig iron that cannot be satisfied. In all local offices there

is a big accumulation of orders that are to be filled when and if the iron becomes available. Inquiries for lots of from 100 to 1000 tons are frequent and, some for large amounts, but no matter how large or small the inquiry, it finds no response on the part of the furnaces and merely takes its place in the files. Meanwhile, the delivery of iron on old contracts leaves little to be desired. Alabama furnaces, thanks to the free deliveries during the past few weeks, are practically all caught up with their arrearages and while it may not be the general condition among Buffalo furnaces, there is at least one big merchant furnace in that region that is now right up with its orders. Virginia furnaces continue far behind, but transportation conditions have improved in that section and there is a better movement than a fortnight ago.

Stocks Better Than Expected

New York, June 3.—The pig iron questionnaires which have been filled in and returned by the consumers, show the latter to be much better provided with iron than was thought. They show that many consumers who in recent months have urgently been requesting deliveries, have large stocks on hand. This favorable showing is due in part to the fact that many consumers, although using iron on a hand to mouth basis, have maintained stocks of varying size to fall back upon in case of emergency. About 75 per cent of the consumers in this district have returned their questionnaires. Several tonnages of foundry iron have been shipped by eastern furnaces to consumers in this district recently, as a result of requests by the government. These ported involve small spot lots of high manganese, gray forge and off-foundry iron. A canvass of the trade shows that of all eastern blast furnaces, only two, which have a comparatively small production of foundry, have not yet sold their second half output. One of these furnaces, however, has made reservations for its regular customers, and will book formal orders as soon as the price has been established July 1. Most makers still have large tonnages to deliver on contracts at $40 and higher. Many makers have not yet completed deliveries on second half of 1917 contracts. Some makers have just begun to make deliveries at the $33 price.

Covered Consumers Favored

Philadelphia, June 4.—Government contracts for castings hereafter will be awarded as far as possible to foundries which have covered their pig iron requirements. This position has been taken by the pig iron division of the war industries board. Several eastern foundries have been rebuked for taking government casting contracts without being covered on iron. One melter took a contract and then notified the government he had not covered, expecting the latter to furnish the metal. The pig iron division, as a result, requisitioned for this contract, all the stock of iron which the consumer had on hand and will supply additional tonnage to finish the contract. This procedure has deprived the consumer of any iron for commercial work. Eastern furnaces which have not sold their output for the second half have been assured they will not be called upon to furnish more than their pro rata share for government work. Thus they will have an opportunity equal to that of other furnaces to care for their regular customers. Considerable basic and foundry iron has been allocated the past week to eastern consumers. Leonard Peckitt, president of the Empire Steel & Iron Co., eastern member of the subcommittee on pig iron, has been given charge of the low phosphorus iron situation. The Midvale Steel & Ordnance Co. blew in this week its Coatesville furnace to make about 12,500 tons of standard low phosphorus from Cuban ore. The Eastern Steel Co., Pottstown, Pa., expects to resume on this grade later with Spanish ore provided the government arranges for the latter.

Survey About Completed

Pittsburgh, June 4.—Survey of the pig iron situation, which is nearing completion, discloses the fact that there will be large tonnages of both steelmaking and foundry iron now being used in the manufacture of so-called less essentials diverted to the production of military necessities. The survey has required a great amount of work on the part of consumers in filling out questionnaires and for this reason has progressed more slowly than had been expected. The committee on pig iron, iron ore and lake transportation, is dealing with a total of 20,000 tons represented by requisitions of the war industries board, but is deferring action till the survey is more nearly completed. These requisitions involve 7000 tons of basic and 13,000 to 14,000 tons of bessemer. Reports received prove to be extremely illuminating to furnace interests. The latter have discovered in numerous instances that a sizable amount of iron which they have been shipping and for which they have committed themselves, is for the production of material not related to war work. One producing interest has found that approximately 2000 tons of steelmaking iron, can be shifted each month to the manufacture of war requirements. It is roughly estimated that 85 per cent of steelmaking iron and 65 per cent of foundry iron is being used for war work. Some blast furnace operators now are of the opinion that government demands can be met and still leave a fair tonnage of iron, especially foundry grades, for commercial users. This view, however, is not shared by all producers. Demand for all grades of iron continues, but is less insistent because consumers appreciate no tonnage is available except occasional off lots. Some consumers have asked furnaces to supply them with any off grade tonnage that may be produced at any time. One furnace interest has promised to supply 1000 tons of foundry iron high in sulphur whenever such tonnage is made.

The war industries board is watching closely to see that production of neither pig iron nor steel is cut down where, in its estimation, this is not necessary. Several operators who were preparing to blow out for relining were asked by the board not to do so. As a result, these furnaces are being kept going and will be until it is imperative that they be blown out. Averages of W. P. Snyder & Co. for May showed that selling prices of basic and bessemer iron were at the fixed levels.

Scarcity Still Grows

Buffalo, June 4.—The scarcity of iron grows with the further mobilization of the nation's steelmaking program and producers are beginning to believe that these conditions will prevail for the duration of the war. No iron can be bought except on government's priority orders and then only in an urgent case, so long as the government's scheme to systematize is pending. Producers are awaiting with no little interest the report of the war industries board, as to whether there will be any iron tonnage of consequence available for the nonwar industries. Little, if any, surplus is looked for in basic and low phosphorus iron as there is a real shortage of these grades now.

No Market in Chicago

Chicago, June 4.—Except that melters are ready to take up any iron offered them no market for pig iron exists in Chicago. Makers are producing all they can drain from blast furnaces and are seeking to distribute it most equitably for the best interest of all. They are not selling because they have none to sell for

delivery this side of 1919. Melters are not inquiring for iron because they have canvassed the market and found it bare. There is demand, but it is quiescent, ready to take anything offered, but not asserting itself. Much attention is being given to the questionnaire of the American Iron and Steel institute. Returns from western foundries are coming in well and give much information. Southern makers are not yet offering anything except off iron, usually low silicon and high sulphur, though some lots carry good silicon content with the high sulphur. This is being absorbed readily.

Consider Freight Changes

Cincinnati, June 3.—The proposed change in pig iron freight classifications has not yet been fully digested by many sellers and producers. It is thought that the recommendations of the Central Freight association to abolish the commodity rate and use only a class rate will in the long run be a good thing for the furnaces, and it will undoubtedly lighten the load of their traffic departments. The advance of 25 per cent that is scheduled to take place June 25 has brought out an insistent call for shipments on contracts. The car supply in the south is easing up and the movement of iron from the Birmingham district is very heavy. Inquiries have lately been receiving only perfunctory notice because the furnaces have no iron to offer.

Rushing Shipments Through

St. Louis, June 1.—Strenuous efforts have been made by southern manufacturers of pig iron to rush tonnages through to this district and other Middle Western points before the new increased railroad rates take effect. The result has been a notable increase in receipts during the past two weeks. Embargoes against territory east of the Mississippi river have also served to stimulate the movement in this direction. Accordmates of the quantity of pig iron going into war work in this district is variously estimated from 60 to 75 per cent with one authority placing it as high as 80 per cent.

Shipments Are Improving

Birmingham, Ala., June 3.—Furnace company officials in the south are carefully watching production and delivery and leaving selling practically to its own accord. Despite the fact that there is some improvement in railroad car situation, delays in deliveries on old contracts still are to be heard. The production is improving steadily and stocks are going down.

Coke Supply Still Easier

Car Supply Now Adequate and Quality of Fuel Improves—Labor Lack Remains Factor—Production Favorable

Pittsburgh, June 4.—Supplies of coke constantly are becoming easier and all furnaces are reported to be in a comfortable position. The quality of the fuel still is below standard, due to irregular charging and drawing of ovens, a condition brought about by shortage and irregularity of placing cars which prevailed some time ago. In some instances, lack of labor also is a factor in this situation. The car supply now is adequate and placements are more regular so that there is a decided betterment in quality of fuel moving to furnaces. The improvement in this respect promises to continue in view of the fact that oven operators are enabled to produce on a more uniform schedule. The car supply on the Monongahela and Pennsylvania railroads in the Connellsville region during the past week averaged 100 and 98.7 per cent, respectively. For May the respective averages were 95 and 96 per cent, as compared with 63 and 78 per cent for April. Fuel is being diverted from idle to active stacks at the direction of the federal fuel administration. No offerings in the open market are being made as yet. Production during the week ended May 25 totaled 340,100 tons as compared with 343,270 tons for the preceding week, according to *The Connellsville Courier*.

Improvement Signs Are Near

St. Louis, June 1.—For the first time in several weeks the feeling in the coke situation locally and to the west and southwest shows slight signs of improving. During the past week fair tonnages have passed through this gateway on their way to hard pressed consumers in western states. The intensive efforts of federal and state administrations to relieve the stringency are beginning to bear fruit. There is still, however, an urgent and heavy demand for both furnace and foundry grades. Production by gas and by-product ovens shows a decided broadening tendency.

Government assistance has been tentatively promised established plants and several large enterprises in process of organization. These interests have been requested to outline definitely just what they can do in the matter of production, with estimates of time and cost of proposed enlargements. These negotiations have been confidential, and publicity at this time other than in general terms, is being avoided both by government agents and the companies involved.

Production is Increased

Cincinnati, June 3.—A late report from the Wise County field shows an increase in production of both furnace and foundry coke. But this increase is more marked in foundry coke and the report is borne out by foundry coke consumers here who obtain some fuel from that district. Shipments from the Connellsville field are improving, and according to statements made by different selling agencies the only trouble lies in an increase in production, which is somewhat curtailed by the scarcity of labor.

No Coke Being Offered

Birmingham, Ala., June 3.—Coal and coke production show slight improvement in Alabama but as far as can be learned no coke is being offered on the open market. Either the manufacturers have promised their coke ahead and are saying very little about it or contracts made some time ago are not expiring as soon as was expected.

Higher Prices

For Tin Concern the Mills—Production Practically Full

Pittsburgh, June 4.—The price of tin continues to increase and it is said that some makers of tin plate in the United States have had to pay as high as $1 a pound for this metal. The levels paid by consumers in this country are said to exceed by 15 to 20 cents a pound those paid by British users. These high costs are one factor which leads some makers of tin plate to feel that the government should grant an increase in price beginning July 1. Other makers apparently do not take this view but think that the price situation was covered sufficiently for the present when the committee on steel and steel products of the American Iron and Steel institute announced advances in the prices of charcoal and terne. The industry is producing at the rate of about 95 per cent of capacity, representing approximately 800,000 base boxes a week.

Fear Yard Scrap Shortage

Authorities Take Measures to Anticipate Lack of Supplies—Unfavorably Located Buyers Permitted to Pay Higher Prices

FOR COMPLETE SCRAP PRICES SEE PAGE 1464

Philadelphia, June 4.—An ominous scrap shortage next fall and winter is foreseen in the present scarcity of yard scrap. Instead of bulging with scrap as usual at this time of the year, the yards are not receiving enough scrap to keep busy. Anticipating future conditions, the subcommittee on scrap is working out a plan to bring to the market scrap from old plants, mines, construction jobs, etc. Large quantities of such scrap, it is believed, can be located and moved with the government's assistance. Much scrap of this character is located in the south. It is contemplated if necessary to withhold material from all consumers who do not need it for essential purposes. In the meantime, wrought scrap is very scarce. The American Board of Scrap Dealers has been asked to locate 10,000 tons of pipe of a new specification for one consumer. Many scrap dealers are asking advice on how to charge freight advances. The authorities say there is no room for question. Since maximum prices are on a delivered basis, the entire freight comes out of the shipper. The scrap rate from New England to eastern Pennsylvania was advanced 38 cents to $2.80, May 25. This rate now is in line with the present rates from New England and New-York to Pittsburgh and from New-York to eastern Pennsylvania, which were advanced several months ago. The general 25 per cent increase will apply on this as well as all other rates. Due to increasing requests from the Pacific coast for information, the subcommittee has decided to appoint a member there who will act same as Chairman Phillips does in the east and middle west. The scrap committee is allowing applications where justified, from unfavorably-located consumers for the privilege to pay higher than maximum prices to equalize freight disparity. This disparity ranges from several cents to $2 and $3 per ton. The report that lower scrap prices can be expected July 1, is declared to be without foundation by the institute authorities.

Shortage Appears Probable

Boston, June 3.—There continues to be an excellent demand for scrap in the local market, with the turnover restricted only by the scantiness of supplies. It would be some exaggeration to say that a shortage exists now, but there is no surplus supply and the indications are in the direction of a marked scarcity later on. Any recent accumulations have been pretty well wiped out and fresh supplies are not becoming available in normal quantity. Prices are strong, with government maximums plus commissions being freely paid. The prices that dealers can charge being restricted, the price they can pay are likewise restricted; it is therefore, impossible to change local quotations.

Dealers Feel Rate Increase

Pittsburgh, June 4.—Dealers in iron and steel scrap will be affected greatly by the increase of 25 per cent in freight rates, effective June 25. Scrap prices are fixed f.o.b. consuming points and in consequence the burden of the rate increase will fall upon dealers. In addition to this many dealers have bought supplies which have not been shipped and in many cases the tonnages were bought f.o.b. shipping points, so that dealers will face the payment of rate increases on both incoming and outgoing material. Some railroads have not yet put into effect the recent general advance of 15 per cent in freight rates and these are expected to make an increase of 40 per cent at one time. One effect of the higher rates probably will be to further intensify shipments to nearest consuming points. There is a freer movement of all of the standard grades, the supplies of which are said to be insufficient to meet the demand. It is less difficult to move material because of the greater readiness with which railroads issue permits. The principal demand is for open-hearth scrap. A consumer in this district bought 1000 tons of heavy cast for open-hearth use at $29, delivered, plus commission.

Pittsburgh Absorbing Freight

Buffalo, June 4.—Inquiries are being received from the Pittsburgh district for certain grades of steel scrap urgently needed and inquiries state that purchasers are empowered to pay the difference in freight to nearest consuming point in addition to the government price. This has been possible hitherto by means of government permits but advantage has not been taken of it in such volume before. The Pittsburgh inquiries are not being well satisfied due to the fact that practically every ton of heavy melting steel or its equivalent is being required here. The largest production of scrap at present is shell steel turnings. The output is constantly increasing in volume. This scrap is being used by mills which have never used it before, though the point has not been reached where it is of any benefit to low phosohorus users. The demand is strong for every grade and the dealer can dispose of almost any tonnage he has on hand. Several large railroad lists will close this week. The Pennsylvania list will run 10,000 tons; the others are blank. A local consumer has been offered heavy steel shearings which were in reality first cut shell turnings and for which the heavy melting steel price was asked. This is in direct violation of government rulings and indicates that some dealers are selling this grade of scrap at a price higher than that of $24, delivered, fixed by the government.

Wait for New Prices

Cleveland, June 4.—Scrap iron and steel dealers here agree with producers and consumers of scrap that increased activity cannot be looked for until after prices for the third quarter are made known late this month. Meanwhile, only enough scrap to tide over immediate requirements seems to be changing hands. Heavy melting steel is most difficult to buy, and were no maximum price fixed, $29 would not command a ton. Both dealers and consumers are hit hard by the increased freight rates, but less adverse comment is heard than ordinarily could be expected. Six months ago the trade would have felt aroused.

Chicago Quiet and Firm

Chicago, June 4.—Although no marked change has taken place in the scrap market here, added firmness is noticeable and some quotations are slightly higher than has been the case recently. Heavier steel grades are in considerable demand, but bar iron rolling mills are not yet coming into the market. Continued scarcity is noticeable in rails, car wheels and some other grades. Railroad offerings are small, the Northwestern just closing a list of 5000 tons, which included 750 tons of steel rails, 500 tons of No. 1 wrought and 300 tons of iron angle bars.

Foundry Consumers Buy

Cincinnati, June 3.—Following a spirited buying movement on the part of foundry melters a lull is reported by nearly all dealers. Last week a number of contracts were con-

summated that covered quite a large tonnage of both No. 1 machine cast and No. 1 railroad wrought. Dealers report some activity in stove plate and they are also receiving calls for heavy melting scrap.

Freight Advance Confusing

New York, June 3.—While many brokers will be hard hit by the recently announced advance of 25 per cent in freight rates on June 25, the trade generally in this city is making every effort to adjust itself to the new ruling. All contracts now being entered into carry clauses dealing with this increase. The burden of this increase will eventually rest chiefly upon the dealers. At present there is some confusion in the trade as to the scope of the new ruling, as it is pointed out in some quarters that the increase of 15 per cent in freight rates late last fall affected only shipments to certain points. During the past week several of the mills in the Pittsburgh district have come into this market for steel scrap, offering to pay the freight differential between western and eastern Pennsylvania points, in addition to the government maximum and the 3½ per cent commission allowed to brokers.

Market Is Softer

St. Louis, June 1.—There is a softer tendency in the scrap market. The feature of the trade this week has been lively effort of dealers to sell their material, most of them believing it the best policy to unload before the new railroad rates take effect. The result has been quite heavy purchases of reserve stocks for shipment to other points, the spread in prices permitting of a fair margin of profit in these transactions. There exists an excellent local demand for iron rails, the price of which has advanced approximately $1. Otherwise, however, little interest has been displayed. Steel is more plentiful than heretofore, and consumers are evidently well supplied by contract, as their purchases have been unusually light, even for this season. No railroad offerings were before the market.

Market at Standstill

Birmingham, Ala., June 4.—Scrap iron and steel dealers in the Birmingham district continue to take a pessimistic view of the situation. In addition to asserting that the market is at a standstill they say that every indication points to a downward revision this month when the government fixes prices again. Railroad cars are plentiful and there is plenty of stock in sight.

Weather Adds to Shortage

Hot Period Cuts Down Output and Makes Semifinished Situation More Acute—Discards in Demand—Electric Steel Sold

Pittsburgh, June 4.—No relief is forthcoming from the scarcity of semifinished steel, and none is in sight. On the contrary, the hot weather is slowing up production somewhat, so that the situation is increasingly acute. The point has been reached where it is not possible to secure enough discard steel to meet demands, despite the large output of shell material. Sheet mills are especially short of bars and some tin plate mills also are in need of greater quantities, both of which are rolling freely from bessemer steel. Inquiries for slabs still come to makers and middlemen from plate producers, but the market in this district has been scoured in vain for additional tonnages. Wire rods are in strong demand, and except for small lots which are supplied occasionally to regular buyers no tonnages are to be found. Makers say that the price of $75, Pittsburgh, for soft rods, is not attractive and are using their steel to make other products required by the United States government or the allies. Inquiry for billets also is active but no offerings are being made except that infrequently small tonnages are found for consumers engaged in government work. One sale made during the past week by a middleman involved 1500 tons of 4 x 4 billets.

Discards Are Offered

Philadelphia, June 4.—Numerous small lots of semifinished steel are being offered in the eastern market. These largely are of discard and offheats steel. The only important sale involved 1500 tons of soft billets to an eastern consumer who is engaged in government work.

Sell Small Discard Billets

New York, June 3.—Numerous large sales of 4-inch and smaller billets rolled from shell steel discards have been made in this district during the past week, and the mills having capacity for rolling the smaller sized billets have taken so much business that they are practically out of the market for months ahead. In many cases, consumers who have been relying upon this steel, and fearing that the government shortly may specify its use for much essential work, have closed contracts for the remainder of the year. In many cases, consumers have been desirous of placing orders also for next year, but the mills have been unwilling to go so far ahead. One of the mills now refuses to book any more business excepting when the orders are accompanied by priority certificates. Demand for large shell discard billets, however, while improved, still has not caught up with the supply.

Electric Steel in Demand

Cleveland, June 4.—A new lot of 3500 tons of electric steel forging ingots and blooms has been placed by a consumer in this district with a large producer. This steel is to go into the building of 3 and 4-inch naval guns for which a new contract recently has been awarded to the buyer. An inquiry for 10,000 to 11,000 tons of electric steel blooms to be delivered 1500 tons monthly has been put out by a northern Ohio buyer. Some of the larger makers of electric steel have been unable to accept this business because of heavy demand for this material. Sheet and tin plate makers continue keenly to seek sheet bars of either standard or off-grade character but they are meeting with their usual experiences of refusal by the mills.

Strip Output is Cut

Pittsburgh, June 4.—Shortage of steel has curtailed the output of cold rolled strip steel and production is estimated at about 75 per cent of capacity. Direct and indirect business for the government represents a great bulk of the bookings made. Demand from private consumers is relatively light and in view of the reduced output of pleasure automobiles inquiry from this source involves small tonnages.

Shenango Elects Officers

After serving for some time as assistant to his father, William P. Snyder Jr., has been elected to succeed him in the presidency of the Shenango Furnace Co., Pittsburgh. W. P. Snyder, who has been head of the company since 1889, becomes chairman of the board. Other officers were elected at the same time as follows: Vice president, C. D. Dyer; vice president and general manager, George L. Collord; treasurer, Henry Irwin Jr., and secretary H. M. Wilson.

Discard Bar Demand Strong

Consumers Fearing Government May Preempt This Material Buy Vigorously—Implement Manufacturers Seek Fall Requirements

New York, June 3.—The buying movement in bars rolled from shell steel discards reached fairly large proportions during the past week. Numerous consumers, fearing that this class of steel shortly may be specified by the government as suitable for certain kinds of essential work, came into the market and called for large tonnages for future delivery. In many cases, consumers bought for delivery through the remainder of the year. Some of them desired to buy even further ahead, but the mills refused. One mill which has a large amount of shell discard bars on its books, has gone so far as to refuse all orders which are not accompanied by priority certificates.

Mills Heavily Booked

Pittsburgh, June 4. Iron and steel bar mills are heavily booked, present schedules calling for probably four months' production. They are taking business which is connected with war work. The 100,000 cars placed recently with builders by the railroad administration will call for large tonnages and these requirements will be given preferred positions on the books of makers. The implement trade also is being supplied with steel bars.

Seek Fall Requirements

Cleveland June 4. — Implement manufacturers in this district have inquired from the mills for authority to place specifications covering their fall requirements. These cases are receiving individual consideration and the tonnages which the producers will ship will be determined by the quantity previously delivered to the customer this year and by that which remains unshipped on old contracts. No new contracts are being made. A local tractor builder has placed an order for 2000 tons of bars and small shapes, covering his construction program for the next year. An inquiry of 1000 tons of soft steel hexagons for spark plugs is current.

Turn to Wrought Iron

Chicago, June 4.—Inability to place orders for soft steel bars except in cases where priorities are given for war purposes is causing many manufacturers to seek bar iron for use in place of steel. This substitution has been going on for some time but recently it has taken on new form and there are signs that it will increase rapidly from now on. Bar iron mills are not rushed and have comparatively small tonnage on their books, most of which will be delivered during the present month with only a small tonnage remaining over for third quarter. In spite of nearness of the middle of the year, practically nothing has been booked for last half delivery except a few small tonnages which will lap over. Demand for hard steel bars rerolled from rails continues strongly in excess of the ability of mills to furnish it. Scarcity of old rails prevents full production and most mills are operating single turn, although they could book sufficient business for full operation were raw material available.

Car Builders Benefitted

Pittsburgh, June 4.—Makers of nuts, bolts and rivets are receiving orders regularly, which are for the government, either directly or indirectly. While it is understood that some large requirements are about to be placed, in addition to those for cars, new business during the past week represented the usual sizes of lots that are being taken regularly. Car builders are to receive rivets from makers at the recently reduced price, amounting to $5 a ton. Makers of nuts, bolts and rivets are operating their plants at capacity.

Demand for Hoop Steel

Pittsburgh, June 4.—Demand is coming from makers of oil, rosin and turpentine barrels for hoop steel. The importance of supplying these users is great inasmuch as they are furnishing their products to the government and consequently mills are taking this business. Producers find it difficult to supply hoop steel to purely domestic consumers. The principal demand for bands comes from jobbers and manufacturing concerns.

Shafting Demand Good

Pittsburgh, June 4.—Demand for cold rolled shafting is active and comes from consumers engaged either directly or indirectly on government business. Large sizes are involved chiefly. Deliveries are being made in 60 to 90 days. Inquiry from commercial consumers is light.

Heavy Bolt Demand

Chicago, June 4.—General demand for bolts and nuts continues strong in all lines and manufacturers are placing orders which are filling mill books rapidly. Nothing has been done recently on the government's heavy inquiry and this matter appears to be held up indefinitely, although quick delivery was asked when the inquiry was put out. Car builders have made reservations for bolts in some cases, but have not been able to file their definite specifications until further information is available.

Cancel Orders

For Wire Nails and Replace Them Abroad—Steel Shortage Felt

Pittsburgh, June 4.—Heavy demand is being made by domestic users for wire and nails. Mills are declining all new business of this character, but are supplying comparatively small lots on specifications. Orders from the United States government and the allies are large and take up all available capacity. Output is considerably restricted owing to the shortage of steel. Some producers are using all the discards they can obtain to make wire and large nails. Because of the annealing process necessary to reduce this steel to the proper state of softness, this kind of production is unusually expensive. Overhead costs also are high and some mills complain that they are unable to make profits at prevailing prices. The quartermaster's depot of the war department has canceled an order it placed recently with a local mill for 12,500 kegs of nails for shipment during the latter part of June and early in July. It is understood that this action was taken because arrangements have been made to get the nails abroad, in order to conserve ship space. A Pittsburgh mill has taken 3000 tons of a large lot of uncoated barbed wire for the British government.

No More Ferro

Likely to Come from England—Regulated by Ore Imports

New York, June 3.—It is unlikely that any more English ferromanganese will be brought to this country due to the long ocean haul involved, according to a statement by a member of the ferroalloys division of the war industries board. There is no objection to selling English ferromanganese, provided English export and American import licenses may be obtained, according to this statement. American import licenses, however, will be issued only when imports of manganese ore into this country fall

below 35,000 tons per month, which tonnage now may be brought in in steamships by consent of the United States shipping board. The arrangement which was made about two weeks ago by the war trade board, permitting the importation of 12,000 tons of English ferromanganese, resulted from the fact that the ore program had fallen behind.

Spiegeleisen has continued to strengthen and now is held at $75, furnace, for 16 per cent for all delivtries.

The Midvale Steel & Ordnance Co. has close to 1500 tons of bessemer ferrosilicon.

Market is Quiet

Pittsburgh, June 4.—The market for ferroalloys is quiet. A consumer south of the Ohio river has taken 500 tons of 70 per cent ferromanganese for the last half at $250, delivered. A consumer in Cleveland has closed for 500 tons of 16 per cent spiegeleisen for last half shipment. The price paid is said to have been between $70 and $75, furnace. A nearby consumer has put out an inquiry for 1000 tons of 16 per cent spiegeleisen. Small lots of this grade for prompt shipments are being sold at $71, furnace. Demand for 50 per cent ferrosilicon is light.

Essential Orders

Filled By Warehouses—Business Is Rejected

Cleveland, June 4.—Local warehouses now uniformly are limiting the acceptance of orders to construction work in connection with war orders or to government manufacturing necessities. Some business not of this kind has been rejected. Stocks are greatly depleted, some leading warehouses now carrying only about one-fifth of normal while more than half the usual sizes are missing. Large rounds and squares especially are scarce.

Shipments Exceed Receipts

Boston, June 3.—Local jobbers in steel and iron products report a much larger outward than inward movement and express the fear that the supply situation is going to be worse before it is better, for the reason that production usually declines in July and August. Those lines that plants working on government contracts require continue to monopolize the business, with structural lines in steadily diminishing request.

Plate Records Are Broken

Carnegie Steel Co. Produces 126,264 Tons in May—Allocating 922,110 Tons For Government Cars—Ship Steel Leads

Pittsburgh, June 4.—Producing 126,264 tons of plates in May, the Carnegie Steel Co. broke all previous records. The 110-inch Liberty mill at the Homestead works turned out 20,973 tons during that month just passed, as compared with its previous highest tonnage of 18,025, rolled in April. This new mill, which began operations early in October, 1917, has consistently shown an increase each month since it was started. Like other plate mills, it is engaged in turning out government work. Plate mills are operating at the greatest capacity possible, but some of them have been unable to reach the maximum on account of a shortage of slabs. All of the output is for the government and no offerings of any kind, so far as can be learned, are available for purely domestic consumption. Car builders are waiting for the railroad administration to allocate tonnages among mills.

Allocating Car Tonnage

Philadelphia, June 4.—Allocation of the rolled steel required for the 100,000 government cars recently awarded now is being made. The tonnage under distribution totals 922,110 tons, the main portion of which is plates with a considerable tonnage of structural shapes and bars included. Bessemer steel is being taken wherever possible. The government car business has been the principal development of the week in the plate market. Some further fair tonnages of plates for government purposes have been placed with eastern mills and large Emergency Fleet and other tonnages are in sight.

Ship Tonnage Leads

Chicago, June 4.—Mills continue to give their heaviest efforts toward the production of ship plates and the larger proportion of new tonnage allocated by the government consists of material of this sort. Tonnage of plates is accumulating on mill books faster than the product can be turned out and in many cases builders are in need of material which cannot be furnished promptly. Since the placing of the heavy tonnage mentioned last week for the construction of 50 ships on the Pacific coast, orders have been for small tonnages, running up to 2500 tons each, but the aggregate has been heavy. Steelmakers are much interested in the distribution of material for railroad cars which has been awaited for several weeks, but which seems no nearer. Just how this tonnage can be produced without reducing the quantity of plates for ships is one of the present puzzles. Some car builders have already filed specifications for material, but these have been returned by mills and will not be entertained until the allocation has been made through the usual channels.

Considerable Pipe

Required for Government Car Orders—Foundries Still Seek Recognition

Pittsburgh, June 4.—Approximately 6000 tons of 1½-inch butt weld pipe will be required for the 100,000 cars recently distributed to builders by the railroad administration. Tonnages of pipe will be taken direct from mills by builders and this class of business will be given a good rating of priority. Development of oil fields for the government is calling for large tonnages of iron and steel pipe, 4 to 8 inches in diameter, and makers are booking this business freely. Active demand also is being made for 4-inch lap weld iron and steel pipe. Better inquiry is out for butt weld sizes, and producers have become rather heavily committed on this grade and some of them have taken lap weld business which insures capacity production for more than one year.

Government Action Withheld

New York, June 3.—Inquiry from the government for miscellaneous tonnages still comprises the bulk of current demand in the eastern cast iron pipe market. Municipal work continues at a virtual standstill and inquiry from private consumers is light. While manufacturers still are endeavoring to obtain a preferred classification for cast iron pipe, no move in this direction has yet been taken by the government.

Demand at Minimum

Chicago, June 4.—With the government frowning on expenditures for purposes not absolutely essential and the recent advance in the price of cast iron pipe, cities are retrenching more and more in this respect. The only tonnage in the west recently under consideration is 260 tons, on which bids were taken May 29 at Hammond, Ind., but no award has yet been made.

Classify Users of Sheets

Official Survey of Industry to be Made to Determine Rank of Priority of Various War Demands—Production at 85 Per Cent

Pittsburgh, June 4.—For the purpose of learning the relative importance of each of the numerous sources of consumption, it is understood that complete official classification of the sheet industry will be made. While virtually all of the output of sheets is entering into the manufacture of war essentials, there is not an entirely clear understanding as to the rank of priority that should be given to users. In order to clear up the situation, it is said to be proposed to work out an official classification. Production in the sheet industry is being maintained at approximately 85 per cent of capacity. Some makers are rolling altogether from bessemer sheet bars. The scarcity of steel makes it improbable that improvement in production will develop. In fact, this shortage, together with the hot weather, may be expected to curtail production further. Government orders for sheets during the past week have not been heavy. Jobbers who supply lots for government work are having this material replaced wherever possible. Reports are in circulation that some jobbers are naming quotations in excess of fixed prices. If this proves true, it has been indicated by information from Washington, that the war industries board will call for the invoices and will take action looking to the cutting off of supplies for such jobbers and to the taking over of current stocks.

Must Get Priority

Philadelphia, June 4.—Consumers of sheets have been informed by the leading eastern maker that they will receive no deliveries on contracts unless they get priority permits. New business in sheets has been light but large allocations are in sight.

Commercial Buyers Disappointed

Youngstown, O., June 5.—Buyers of sheets are inquiring exceedingly heavy among valley makers for all grades but more particularly black and galvanized. Few contracts have been closed lately with domestic buyers on account of the mills being in such a sold-up condition for months to come. All mills are rolling governmental tonnages and the latter are so heavy that few sheets other than overage and wasters are available for the domestic buyers until the beginning of the last quarter. A few makers are of the opinion that few sheets will reach the domestic trade before the first of the coming year. Many cantonments are to be enlarged and this will require further tonnages of galvanized. Jobbers are finding it hard to replenish their stocks although mills are furnishing tonnages to them whenever permits are presented showing that the material is to be used for war purposes. The jobber does not necessarily have to obtain a permit direct from the government. If he sells a tonnage of sheets out of stock to a buyer who presents a permit, the mills when tendered the latter will deliver a like tonnage to the jobber.

Yard Plans Need Shapes

Proposed Enlargements of Atlantic Ship Plans Call for Big Tonnage—Little Commercial Material For This Year

Philadelphia, June 4.—A large tonnage of structural material will be required for the proposed extensions to various Atlantic shipyards. The Sun Shipbuilding Co. will add four ways, the New York Shipbuilding Co. will double its plant, the Newport News Shipbuilding & Dry Dock Co. will add ways, erect a boiler shop at Richmond and other additions are proposed by various plants. The American International Shipbuilding Corp. has begun the award of fabricated material estimated at 150,000 tons for 60 additional vessels. Structural shapes for the government cars are being allocated. Bessemer steel to considerable extent is being used.

Business at Minimum

New York, June 3.—Demand for structural steel is at a minimum in this district. Jobs placed total less than 5000 tons, and the largest of the bookings involve 3700 tons for the Culver Rapid Transit extension, Brooklyn, which formally has been placed under contract with the Bethlehem Steel Bridge Corp. Only two new jobs are up. These call for 800 tons. Priority orders for plain shapes during the past week have been of almost negligible proportions.

Building at Low Ebb

Chicago, June 4.—Aside from structural material furnished to fabricating shops for ship work, practically nothing is being turned out in a structural way. The Northwestern Bridge & Iron Co., Milwaukee, has taken 450 tons for a girder shop at the plant of the Pawling & Harnischfeger Co. at Milwaukee. Another small tonnage has been placed in the west involving 158 tons.

Good Deliveries Given

Pittsburgh, June 4.—Despite heavy demands being made upon them fabricators are giving good deliveries of government requirements. Large tonnages are being placed by the Emergency Fleet corporation, and the navy department. Business also is being taken from machine tool manufacturers engaged in war work who are extending their plants.

CONTRACTS AWARDED

Girder shop for the Pawling & Harnischfeger Co., at Milwaukee, Wis., 450 tons, to Northwestern Bridge & Iron Co.

Steel tipple for the Valier Coal Co., Valier, Ill., 158 tons.

Bridge for Lehigh Valley railroad, 100 tons to American Bridge Co., and 100 tons to an independent fabricator.

Extension to Vulcan Iron Works' plant at Wilkes Barre, Pa., 900 tons to Hedden Iron Construction Co.

Culver Rapid Transit line extension, Brooklyn, 3700 tons, formerly awarded to Bethlehem Steel Bridge Corp.

Addition to plant of Studebaker Corp., South Bend, Ind., 1600 tons to Wisconsin Bridge & Iron Co.

Building at Branford, Conn., for Eastern Malleable Iron Co., 300 tons to Bogert-Carlough Co.

CONTRACTS PENDING

Building for Vermont Milk Chocolate Co., Burlington, Vt., 200 tons, bids being taken.

Buildings for Gulf Sulphur Co., 600 tons, bids being taken by J. G. White Engineering Company.

Extensions to plant of Westinghouse Electric & Mfg. Co., Essington, Pa., 5000 tons to be awarded by Westinghouse, Church, Kerr & Co.

Made Ore Manager

Lewis D. Newman has been made manager of the Great Northern Iron Ore Properties. For some time he was private secretary to R. A. Jackson, general counsel of the Great Northern railroad. Later he was assistant to Carmi Thompson, general manager of the ore properties. He has been filling that post since Mr. Thompson resigned.

Pig Iron Output Near High Record

Production in May Exceeds All But One Month in Country's History—Number of Stacks Now in Blast Sets New Mark for Recent Years

PIG IRON production is approaching the highest level in the history of the country. May's output has been exceeded only once, that being in October, 1916. The pronounced decline in output which began just 12 months ago and continued until January, has now been more than overcome. The blast furnaces produced in May 3,448,207 tons, compared with 3,273,355 tons in April, a gain of 174,852 tons. Production in May, 1917, was 3,413,677 tons, and in October, 1916, the banner month, 3,508,180 tons.

AVERAGE DAILY PRODUCTION

	1918	1917	1916	1915	1914
Jan.	77,523	101,930	102,319	51,323	60,624
Feb.	82,794	94,641	106,157	59,521	67,450
Mar.	103,548	105,026	107,343	66,009	75,534
Apr.	109,112	110,936	107,517	70,484	75,383
May	111,232	110,119	108,535	72,747	67,646
June	.....	108,675	107,127	78,998	63,486
July	.....	107,659	103,907	82,687	63,075
Aug.	.....	104,483	103,156	89,510	64,403
Sept.	.....	104,691	106,935	94,478	62,757
Oct.	.....	106,332	113,167	100,656	57,007
Nov.	.....	106,620	110,593	101,174	50,042
Dec.	.....	93,077	102,715	103,278	48,236
Av'ge	97,039	104,562	106,610	81,022	62,934

The average daily output last month was 111,232 tons, against 109,112 tons in April, a gain of 2120 tons. Steelworks or nonmerchant furnaces made the bulk of the gain, their average daily output jumping to 81,513 tons in May, from 80,182 tons in April, an increase of 1331 tons. The daily production of merchant iron in May was 27,915 tons, against 27,597 tons in April, a gain of 318 tons. The total output of nonmerchant iron last month was 2,526,895 tons, against 2,405,467 tons in April, a gain of 121,428 tons. Merchant iron production last month was 865,374 tons, compared with 827,921 tons in April, a gain of 37,453 tons.

More stacks are now in blast than at any time in recent years. On May 31, 361 furnaces were active against 351 on April 30. A year ago 340 furnaces were in blast, this number increased to 357 on August 31 and dropping off after that date. The October, 1916, record was made with 328 furnaces.

Ferro production in May was 36,898 tons against 29,536 tons in April, an increase of 7362 tons. Spiegel output last month was 19,040 tons against 10,431 tons in April, a gain of 8609 tons.

The Stewart Iron Co., Ltd., Sharon, Pa., blew out its blast furnace on May 12 for relining and general repairs.

The Mattie furnace of the A. M. Byers Co. of Ohio, Girard, O., was blown out on May 29. This stack will be relined.

MAY PIG IRON

States.	No. of stacks.	No. in blast last day of month. May	Apr.	Total tonnage made Merchant.	Non-Merchant.	—Totals— May	Apr.
Pennsylvania	160	136	134	227,023	1,082,455	1,309,478	1,275,389
Ohio	79	74	70	170,823	622,721	793,544	734,284
Alabama	47	32	31	120,320	91,962	212,282	207,245
Virginia	21	14	13	40,754	.....	40,754	39,510
New York	28	24	22	94,854	142,162	237,016	201,872
New Jersey	5	5	5	23,424	.....	23,424	21,558
Illinois	25	23	23	69,805	235,542	305,347	302,292
Colorado	6	4	4				
Indiana	15	15	15	31,194	298,920	330,114	315,034
Maryland	4	3	3				
Wisconsin	6	4	4				
Kentucky	7	5	5				
West Virginia	4	3	3	54,390	26,892	81,282	77,107
Tennessee	17	11	11				
Washington	1	1	1				
Georgia	2	0	0				
Texas	3	0	0				
Minnesota	3	3	3	32,787	26,241	59,028	59,097
Michigan	3	3	3				
Missouri	1	1	1				
Spiegel—All states						19,040	10,431
Ferro—All states						36,898	29,536
Total	437	361	351	865,374	2,526,895	3,448,207	3,273,355

Increased Rates

On Iron Ore Will Go to Upper Lake Railroads

Cleveland, June 4.—Increased freight rates on iron ore continue to hold the interest of the ore trade. Plans of the railroad administration at this time are understood to call for an advance of 33.6 cents per gross ton on iron ore shipped from the mines to upper lake ports. Railroads handling either direct or dock ore from lower lake docks to furnaces, under this plan, would receive no increase. The fractional rule will be observed, bringing the Mesabi rate, for instance, from 63.5 cents to $1. The original announcement of 30 cents a ton has been decided as applying to net tons.

MONTHLY PRODUCTION

	1918	1917	1916
January ...	2,403,227	3,159,839	3,171,878
February ...	2,318,242	2,649,935	3,078,548
March	3,209,996	3,255,813	3,327,630
April	3,273,355	3,328,061	3,225,496
May	3,448,207	3,413,677	3,364,584
Total 5 mos.	14,653,027	15,807,325	16,168,136
June	.....	3,260,234	3,213,818
Total 1st half.	.....	19,067,559	19,381,954
July	.....	3,337,442	3,221,127
August	.....	3,238,970	3,197,838
September .	.....	3,140,742	3,208,041
October	.....	3,296,286	3,508,180
November ..	.....	3,198,597	3,317,805
December ..	.....	2,885,380	3,184,178
Total 2d half	.....	19,097,417	19,637,169
Grand total.	14,653,027	38,164,976	39,019,123

Mining companies under the present plan would pay all of the increase as ore, of course, is sold lower lake docks. Before the rate becomes effective on June 25, these companies and lower lake railroads hope to secure some modification of the plan.

Efforts are now being made by lower lake railroads to secure the increased freight on ore handled by upper lake railroads just prior to June 25 and which is carried to the various furnaces after that date. Under present arrangements, such ore would not pay any increased freight rate.

Iron ore shipments up to June 1 are 39 per cent heavier that last year. Shipments in May total 8,792,231 tons against 6,283,612 tons shipped in May, 1917. Shipments up to June 1 are 9,028,101 tons against 6,495,144 tons in 1917, and 10,107,991 tons in 1916. Boats are receiving good dispatch and the movement continues heavy. Last month's total was the highest of any May in the history of the ore trade. Detailed shipments by ports follow:

Port	Gross tons
Escanaba	655,495
Marquette	495,043
Ashland	898,147
Superior	2,088,029
Duluth	3,055,083
Two Harbors	1,600,434
	8,792,231

Propose to License Nonwar Needs

Joint Committee of Producers and War Industries Board Understood to Have Accepted This Plan to Distribute Any Surplus Iron and Steel—Baruch Credited With Estimate of 20 Per Cent For Open Market

WASHINGTON, June 4.—A license system to regulate the use of pig iron and steel not going into direct or indirect war consumption probably will be adopted by the war industries board as the solution of the problem arising in the board's contention of an acute shortage of both materials and of the steel manufacturers' claim there will be sufficient steel, if properly allocated, for all essential consumers. It is understood the joint committee representing the board and the industry have agreed upon this plan which will be submitted to the board for its consideration and ultimate adoption.

At the office of J. Leonard Replogle, director of steel supply and at the Washington headquarters of the American Iron and Steel institute attempts to confirm this information met with no success although at neither place was it denied that the license system may be adopted. The committeemen representing the institute met with Mr. Replogle in New York last Saturday following the fourteenth general session of the institute, but what transpired is withheld. Neither Mr. Replogle nor H. P. Ingels, secretary of the board, would say when the board would hear the committee's report, although this may be expected soon, because Chairman Baruch of the board urged immediate action when the joint committee was named May 17.

The license system, if adopted, would be somewhat similar to that employed in England. It would be adjusted to the war industries board's present plan of priority rating by which all war or semiwar orders of pig iron, steel and other important materials automatically are licensed when priority certificates are issued. If the licensing plan is inaugurated, it means that every pound of steel leaving American mills will be under priority or license authority.

Mr. Replogle, who has been director of steel since early last autumn, in all probabilty will be placed at the head of the license system, or, in other words, the license system will be made part of the steel division. Mr. Replogle's staff already has grown from two or three assistants to more than a dozen and adoption of the proposed plan will see the number increased to hundreds. It will be one of the largest sections of the war industries board, with every mill and furnace in the country receiving its orders from Mr. Replogle or assistants empowered to countersign allocations for him.

Baruch Changes Views

The unfolding of this information today leaves a puzzling situation which developed last Saturday in statements carried in several newspapers which quoted "a high official of the war industries board" as saying that war orders of the United States and allied governments will require 80 per cent of mill capacity. It could not be learned authoritatively who this high official is but it is understood the statement was made by Chairman Baruch to several newspapermen when his attention was called to accounts carried in other papers of Mr. Replogle's address.

If Mr. Baruch made the statement, it is contrary to his declaration to THE IRON TRADE REVIEW following the meeting with steel manufacturers here May 17. At that time he declared he fully believed there would be little if any surplus after war orders were filled. This has been the contention of Mr. Replogle.

One explanation forthcoming today was that Mr. Baruch, undoubtedly besieged by many manufacturers of fabricated steel articles to take no step detrimental to their interests, and desiring not to be openly in the position of debating Mr. Replogle, told the newspapermen that there will be a surplus in order to pacify the so-called less-essential industries.

In THE IRON TRADE REVIEW last week it was stated that the survey being undertaken by the committee would in all probability fail because of the lack of knowledge of the government's steel requirements. This now is generally admitted, but it is pointed out that the information being accumulated from various sources will give the industry and the board a fairly clear idea of the nonwar needs and more clearly define the task of culling the essential from the nonessential. Mr. Replogle frankly admits the situation is due to pig iron production problems as previously outlined in this paper.

Government Adopts the Cleveland Plan

WASHINGTON, June 4.—Appreciating the need for a decentralized organization, which through its various branches can furnish a point of direct contact between the government and the manufacturers, the war industries board has created the resources and conversion section under C. A. Otis of Cleveland. Full authority is given Mr. Otis to proceed with the organization of such agencies as he deems best suited to supply the needs of the army, the navy and other government departments.

The plan of organization as proposed by Mr. Otis divides the entire United States in 20 regions with regional headquarters in each case at a designated site within the territory covered. Each of these industrial areas, or regions, will be under individual directors who were today appointed by the resources and conversion section of the war industries board. These local chiefs are local men who have the personal knowledge of and acquaintance with manufacturers in their regions. The directors appointed in each of the 20 districts designated are as follows:

Henry I. Harriman, Boston; George E. Crawford, Bridgeport, Conn.; William F. Morgan, New York; Ernest R. Trigg, Philadelphia; George S. Oliver, Pittsburgh; Harper Sibley, Rochester, N. Y.; Myron T. Herrick, Cleveland; Allan A. Templeton, Detroit; Lucius Teetter, Chicago; A. Clifford Shinkle, Cincinnati; Frank N. Hoen, Baltimore; W. H. White Jr., Atlanta, Ga.; M. W. Bush, Birmingham, Ala.; Frank D. Crabbs, Kansas City, Mo.; Jackson Johnson, St. Louis; D. R. Cotton, St. Paul; August H. Bogel,

Milwaukee; Louis Lipsitz, Dallas, Tex.; Frederick J. Koster, San Francisco; A. J. Rhodes, Seattle.

The intention is to organize each region along the lines already developed by the Cleveland district war industries commission. The plan of this organization was explained in full in the May 16 issue of THE IRON TRADE REVIEW. Local chambers of commerce and other business associations have been requested to form the division industrial units.

The various classes of industry under the regional organizations will be thoroughly familiar with the resources of the manufacturers, and are expected to be able to furnish the resources and conversion section with accurate information. The division in turn will act as a clearing house between the government departments requiring supplies and the manufacturers. Accurate knowledge regarding materials and supplies to be purchased will be transmitted to the regional offices and thus directly to the manufacturers who will be able to handle the work to be allotted. Each regional division eventually may maintain a Washington representative who through the resources and conversion section of the war industries board may keep in direct contact with his division and at the same time will be immediately available to the government procurement departments or the war industries board for prompt action in giving data on manufacturing.

The organization being set up by Mr. Otis is a governmental agency, deriving authority under the war industries board, and responsible to the government directly. The regional organizations which will come into existence through this plan will originate with the manufacturers themselves, will be organized and subdivided under the various classes of industry, and will function in gathering information from first-hand knowledge of production facilities. Further, the regional organizations will serve to disseminate information gathered and furnished by the resources and conversion section of the war industries board. The new section will assemble and distribute information as quickly as possible, and the intention is to interfere in no way with the work now being carried on by such agencies as the American Iron and Steel institute.

Fighting to Wipe Out Commodity Rates

WASHINGTON, June 4.—The railroads are expected to continue their fight to shift iron and steel articles from the commodity rate basis to that of class rates. Three days intervened between the time they filed their applications and the time Director General McAdoo ordered a general increase of 25 per cent in all freight rates. Whether the interstate commerce commission will allow the railroads' own plea in the face of the McAdoo order is altogether another question. On this point opinions differ and at the commission's offices here it is impossible now to get an inkling of its attitude.

Through their agents in the Central Freight association, the Western Trunk Line association, the Mississippi Valley association and the St. Louis-Cincinnati-Louisville committee, the railroads filed their applications May 22. This was three days before Director General McAdoo issued his order, although it was not publicly announced in full detail until May 27.

The exact words of the interstate commerce commission, expressed in another case, were used by the railroads to indicate their firm intention of endeavoring to remove the iron and steel articles from commodity bases and place them in the class rate schedules.

Reference to the accompanying table, made up from examples taken from the exhibits supplied by the railroads in their application, will show what the present commodity rates are, the rates of the class basis if allowed, and each as will be altered by the McAdoo 25 per cent increase which becomes effective June 25. The table also shows the increases in each instance.

Examination of petitions filed by the railroads reveal the fact that they propose to take bessemer ferrosilicon and silvery iron out of the pig iron class and to place these products in the sixth class with the proposed billet rate. Ferromanganese, spiegeleisen and manganese ore also would be given the sixth class rating. The advances proposed on bessemer ferrosilicon, silvery iron, spiegeleisen, ferromanganese and manganese ore would be exceptionally heavy and would be probably 60 cents a ton on ferrosilicon and silvery iron from southern Ohio furnaces to Pittsburgh. Protests already are being made by the consuming interests dependent upon furnaces at Jackson, New Straitsville and Wellston, O., for supplies.

PIG IRON

Haul	A	B	C	D	E	F	G
Pittsburgh to Chicago	$2.70	$2.70	$0.00	$3.38½	$0.68½	$3.38½	$0.68½
Cleveland to Middletown	2.20	2.30	.10	2.75	.55	2.87½	.67½
Youngstown to Detroit	2.20	2.40	.20	2.75	.55	3.00	.80
Buffalo to Toledo	2.10	2.60	.50	2.62½	.52½	3.25	1.15
Pittsburgh to Kalamazoo	3.30	2.90	.40*	4.12½	.82½	3.62½	.32½
Chicago to Lima	2.00	2.30	.30	2.50	.50	2.87½	.87½

BILLETS

Haul	A	B	C	D	E	F	G
Pittsburgh to Chicago	$3.60	$3.50	$0.10*	$4.50	$0.90	$4.37½	$0.77½
Cleveland to Middletown	2.30	2.60	.30	2.87½	.57½	3.25	.95
Youngstown to Detroit	2.30	2.70	.40	2.87½	.57½	3.37½	1.07½
Buffalo to Toledo	2.30	2.90	.60	2.87½	.57½	3.62½	1.32½
Pittsburgh to Kalamazoo	3.50	3.20	.30*	4.37½	.87½	4.00	.50
Chicago to Lima	2.40	2.60	.20	3.00	.60	3.25	.85

Explanatory:
*Decrease.
A, present commodity rate per ton; B, proposed class rate per ton; C, increase class over commodity; D, rate under McAdoo 25 per cent increase; E, increase McAdoo over present commodity; F, rate if railroad application is approved plus McAdoo increase; G, increase combined McAdoo and class rate over present commodity.

Greater Capacity

Scheduled for Shipyards, Schwab Announces—Turbines Produced

Great increases to shipyard capacity are in contemplation according to an announcement made by Charles M. Schwab, director general of shipping of the Emergency Fleet corporation, following a banquet tendered him by W. H. Donner, president of the Donner Steel Co., at the Bellevue-Stratford, Philadelphia, May 29.

Turbine producing plants as well as two or more large fabricating plants are likewise to be built. Mr. Schwab said: "I expect to increase the Westinghouse Electric & Mfg. Co. plant at Essington at least 40 per cent. Either these works or those of the General Electric Co. must be increased to meet the demands of shipbuilding for engines and other accessories, or we will build plants to produce the turbines for Hog Island, the Merchant Shipbuilding Corp. at Bristol, and the Submarine Boat Corp. at Newark."

Further Concession

Made by Ordnance Department in Steel Casting Specifications

Washington, June 3.—Further concessions in the specifications for steel castings have been granted by the United States bureau of army ordnance which provide for a reduction of the elastic limit for cast steel No. 2 from 32,500 to 31,500 pounds per square inch and for cast steel No. 3 from 42,000 to 36,000 pounds per square inch. Before the recent change in the physical requirements for No. 3 cast steel the elastic limit was 40,000 pounds per square inch and this downward revision will enable steel casting manufacturers generally to meet this physical property.

However, cast steel No. 2 may be used in place of cast steel No. 1 in all cases where the latter is called for and cast steel No. 3 may be substituted for cast steels Nos. 1 and 2. This concession will greatly expedite steel foundry operations since it permits the substitution of the higher grades of steel for the lower grades and this will enable foundrymen to pour the higher grades of steel into other molds when desired. It always is difficult to gage exactly the weight of a heat and if a heat of No. 3 steel is being made and in the event of a surplus amount of this metal after pouring molds in which No. 3 steel is specified, this surplus metal may be poured into molds in which either steels Nos. 1 or 2 are required.

The revised specifications also provide that in cases where the carbon content does not exceed 0.35 per cent, the phosphorus may run as high as 0.06 per cent with the sulphur 0.08 per cent. In announcing these reductions of physical qualities the bureau of army ordnance stated that these will be granted until further notification only, since they are made for the purpose of facilitating the immediate production of steel castings. As finally revised the physical requirements for steels Nos. 1, 2 and 3 are as follows:

Cast steel	No. 1	No. 2	No. 3
Elastic limit, pounds per square inch	27,000	31,500	36,000
Tensile strength, pounds per square inch	60,000	70,000	80,000
Elongation, after rupture, per cent	22.0	18.0	15.0
Contraction of area, per cent	30.0	25.0	20.0

Holding Largest Meeting

Worcester, Mass., June 5.—The largest spring meeting in the history of the American Society of Mechanical Engineer is indicated by the early registration for the sessions now being held in this city. Over 600 had registered up to Wednesday morning. A feature of the meeting will be discussions of munition making at a special New England session.

J. R. Freeman of Providence has been appointed to represent the society on the national engineering research council. Special committees on the readjustment of industries for war work have been authorized and will be appointed later. The next spring meeting will be held at Detroit.

The address of welcome Tuesday evening was by R. Sanford Riley, president of the Worcester chamber of commerce. Other speakers were Charles T. Main, president of the society and Hon. Charles G. Washburn.

Shape Plans for Midvale Ordnance Works

Philadelphia, June 4.—Preliminary details are being shaped providing for the erection of a large government ordnance plant by the Midvale Steel & Ordnance Co. The Midvale company has formally agreed to undertake this work and now is drafting plans for the new plant.

The location of the works will be at Nicetown, this city, adjacent to the present plant of the Midvale Steel Co. Considerable additional land will be required for the new plant.

Plan By-Product Plant

Buffalo, June 4.—The Donner Union Coke Corp. will build near the plant of the Donner Steel Co. a $7,000,000 coke plant for the use of the government. The project is being financed by the government and its product will be used during the war for war purposes. After the war the Donner Steel Co. and the Buffalo Union Furnace Co. will take over the plant. Work on the ovens, one of the principal by-products of which will be bases used in the making of high explosives, will start without delay, and it is hoped to complete the final unit within fourteen months. Some units will be available before then. It is estimated that the plant will cover 40 acres and will use 2000 tons of coal per day. A large quantity of gas will also be made.

The Non-Ferrous Metals

Copper Lead Spelter Tin

	*Copper	†Spot Straits, tin	‡Lead, New York basis	Spelter St. Louis basis	§Aluminum	Spot antimony
May 29	23.50	.....	7.05	7.20	32.00	12.00
May 31	23.50	.....	7.07½	7.20	32.00	12.00
June 3	23.50	.....	7.15	7.25	33.00	12.00
June 4	23.50	.....	7.20	7.30	33.00	12.25

*Government fixed maximum price for prime lake, electrolytic and casting copper, in ingots, pigs, slabs, etc., less than carloads, 24.67½c.
†No spot Straits tin offering.
‡Outside market, prompt shipment.
§Government fixed price for 98 to 99 per cent ingot aluminum in 50-ton lots; lots 15 to 50 tons, 33.10c; one to 15 tons, 33.20c.

New York, June 4.—The war industries board last week announced the revision of the maximum price for ingot aluminum up 1c to 33c for 98 to 99 per cent metal, in lots of 50 tons and more, with differentials for other grades and smaller quantities the same as those existing previously. Differentials on sheets, wire and rods were increased 12½ per cent. The maximum price for No. 18 gage sheets, 3 to 60 inches wide, is thus now 42c, in 50-ton lots, 42.10c in lots 15 to 49 ton and 42.20c, lots 1 to 14 tons. The new prices will be effective on deliveries made between June 1 and Sept. 1.

The tin market has eased off further the past week, largely due to the partial letting down of the bars on Banca tin, which grade of metal now is finding its way into our markets again. Chinese tin for May shipment from China is now offered at 84c, as compared with about 99c a few weeks ago; May shipment, 81c. Spot 99 per cent tin is offered at about 95c. It remains difficult to obtain Banca tin because of the still unsatisfactory shipping situation.

There is little to be said about copper, which continues to be distributed at the government fixed maximum of 23.50c, which remains effective until August, 15c for carloads, and 24.67½c for less than carload lots.

The government is taking bids on 250 tons of antimony June 5. This is the only reported business of consequence at present pending in antimony.

June supplies of lead seem to have grown scarce and outside sellers are holding firmer views. Outside quotations are ranging from 15c to 30c, above the leading interest's price, which is 7c, New York.

The spelter market is steady and apparently a trifle firmer than earlier in the week. Sellers are asking around 7.25c to 7.35c, St. Louis, for prompt June and July shipment, and are showing reluctance to commit themselves beyond July, owing to the uncertainty of the ore situation.

Heat Treating Sub-Chaser Parts

The Engines of the Little U-Boat Hunters Are Subjected to Constant Racking Strains—Their Parts Must Stand Up—This Article Tells How Stamina is Secured

BY L. A. DANSE

ONE of the interesting appurtenances of peace developed by the allies under war's necessity to a high state of efficiency is the speed boat, or, in common parlance, the sub-chaser.

Of its mechanism the motors are pre-eminent. Usually built in twin sets, one a starboard unit and the other a port unit, to drive twin screws; they are the last word in heavy duty, slow rotative speed engines.

The exigencies of their use in pursuing the lurking German U-boat puts the hardest kind of strain on these boats and their motive equipment. They must be what sailors call handy; that is, quickly respond to a change in course, turn almost within their length and maintain full speed while executing these and other maneuvers.

The motors are stationed at port and starboard in order to facilitate this quick handling. They must stand the racking strain of being suddenly thrown into full speed astern while going full speed ahead.

Such boats could be made either with a reverse gear to drive the propeller astern, or the motors may be designed to run with equal speed ahead or astern, either in unison or in opposite directions. The latter is the course pursued.

Method of Reversing

The reversing is accomplished by slowing the motors down and throwing the reverse lever over on the quadrant, which shifts the camshaft longitudinally in the bearings. There are two sets of cams on the shaft and when a shift is made the disengaged set comes into position, timing the valves for running in the opposite direction. As the motors are started by air, if the shifted shaft does not catch the cams in the right position to start backwards, the air starter lever is tipped and the motor spins and starts.

It is the necessity of strength to withstand the severe stresses incident to quick handling, quite as much as the necessity for stamina to undergo the grilling of long runs at high speed, which calls for the best heat-treatment of the motor parts and care in selecting and handling the material.

The cylinders are gray iron cast individually. As the motors are of the open base, marine type, the crankcase familiar to automobile or aeroplane practice is noticeable by its absence. In its place, to support the cylinders on the bed plate, is a series of steel posts fastened in the bed plate and to lugs on the cylinders.

The camshaft mechanism, with the rocker levers, etc., is mounted on these posts.

The exhaust valve is in a port at the side of the combustion chamber, forming an L-head cylinder. The valve is water-cooled and is operated through push rod and rocker levers. The air starter valve is also in the port. The intake valve is mounted in a cage in the head. Ignition is by make-and-break igniter plugs and magneto. The carburetor is of the constant level multi-jet type. Cylinder water-jackets are cast in the cylinders. Crankshafts are of the seven-bearing type, the motor being six cylinder, as is illustrated.

The author of this article, L. A. Danse, is chief of the heat treating department, Lincoln Motor Co., Detroit, manufacturer of airplane engines. This material was published originally in Houghton's Herald.

A FLEET OF SUB-CHASERS WAITING THEIR TURN TO POUNCE ON THE U-BOATS

These little boats are performing a tremendously valuable service for our cause in the war. For their machine parts the best is none too good and in their construction high grade alloy steels scientifically heat treated play a prominent part.

From the foreging very brief summary, the magnitude of the task facing the metallurgist and engineer can be grasped.

The cylinder castings are roughed out, and then annealed by being heated in a large semi-muffled furnace, oil-fired, to about 800 degrees Fahr.

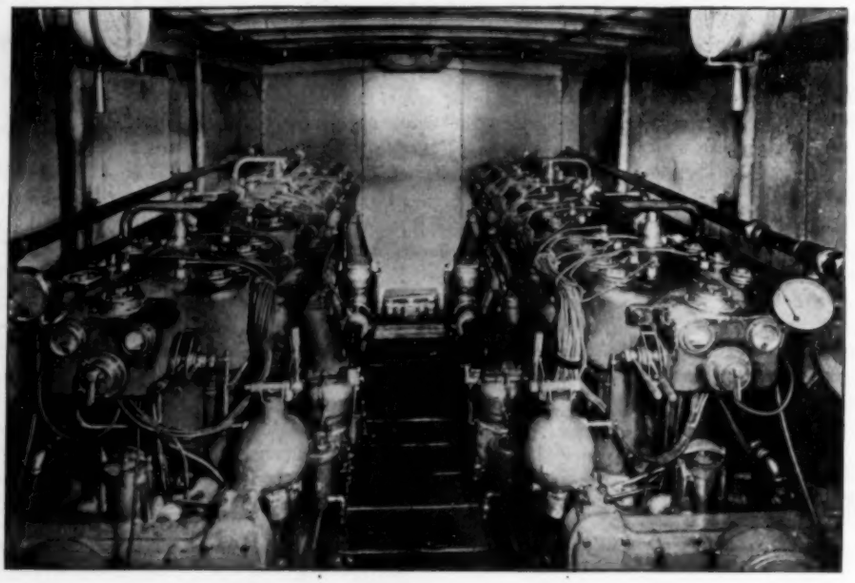
They are cooled in the furnace, slowly, to relieve all casting and machining stresses. As the bore is 10 inches and stroke 11 inches and the cylinders are treated eight to the charge, care is needed to see that so large a furnace as that required is evenly heated. Operations are carefully checked and controlled by pyrometers and heat record numbers.

The pistons are also of gray iron and are annealed in much the same manner as the cylinders.

After this annealing, very little trouble need be anticipated from warpage in the pistons under service. Crankshafts are forced up from 0.40 per cent carbon open-hearth steel billets, roughed out and heat-treated by heating to 1500 degrees Fahr., and after quenching in soluble quenching oil; are then tempered at 900 degrees Fahr. This is a heavy job and requires big equipment for handling. Connecting rods are drop-forged from 0.35 per cent carbon open-hearth steel and treated in the rough as follows: Heated to 1520 degrees Fahr., quenched in soluble quenching oil in a vertical position, to prevent warping and the necessity of straightening; tempered by heating to 750 degrees Fahr., and cooled in air. The minimum tensile strength specified is 70,000 pounds, and actual strength as tested should range from 85,000 to 90,000 pounds per square inch.

Connecting rod bolts are of 0.30 per cent carbon open-hearth cold-drawn steel. They are untreated, but are required to pass physical tests and, if not up to standard, are treated to increase their strength.

Piston wrist pins are of 0.20 per cent carbon open-hearth steel, bored and turned from solid bars, carburized hard and then ground. Due to their large size and the fact that the specifications call for ⅛-inch case and 65 scleroscopic hardness after grinding, they are packed four in a box with quick light carburizer. The holes are plugged with fireclay. The carburizing heat is 1600 degrees Fahr., and the carburizing time in the furnace is 12 hours. They are quenched directly from the carburizing box into soluble quenching oil; reheated to 1550 degrees Fahr. and again quenched in soluble quenching oil. They are then rough ground and returned to the heat-treating shop to be heated to 1440 degrees Fahr. and quenched in brine. Tempering is in the same oil at 400 degrees Fahr. These pins when completed are very fine and can be flattened out in a steam hammer until the walls meet without shattering or chipping under the repeated heavy blows.



THE MOTOR IS THE HEART OF THE SUB-CHASER

These engines are operated continuously for many hours at a stretch in a service where failure may mean loss of life. Practically every part is individually heat-treated including even the cylinders and pistons

The eccentric for operating the air pump is a disc of 0.20 per cent carbon open-hearth steel, 9 inches in diameter by 1 inch thick, with a ⅛ inch wide rib ⅛ inch high around the center of the rim. The center is cut away in holes for the crankshaft and to lighten the eccentric on the high side. This is carburized and hardened after finishing. It is also a difficult operation, as the piece must be kept perfectly smooth, must have a 60 scleroscopic hardness and must run true.

The eccentrics are packed in a round box, flatwise, six high, all laid on each other, the holes plugged with fireclay and 2 inches of quick light carburizer between the rim and the inside of the box. The carburizing heat is 1500 degrees Fahr., and the time in furnace is 10 hours. The pieces are quenched directly from box into a bath of cold water on the surface of which is ½-inch of soluble quenching oil. Very good results from every standpoint are obtained by this method.

The propeller thrust bearing plates are discs of open-hearth 0.20 per cent carbon steel mounted on the crankshaft and held by yokes bolted to the bed plate. They are about 9 inches in diameter and 1 inch thick. They are carburized in the same round boxes as the eccentrics, but only four high, leaving 1 inch of quick light carburizer between them. The carburizing heat is 1600 degrees Fahr. and the time in furnace is 14 hours. They are quenched from the carburizing box into soluble quenching oil. They are then reheated, ground and tempered in the same manner as are the wrist pins. The water circulating pump is of the double-acting reciprocating type and is driven through reduction gears from the crankshaft. These are spur gears and all but the crankshaft pinions are heat-treated. They are of 0.30 per cent carbon, 3½ per cent nickel steel and are heated in lead pots to 1500 degrees Fahr., quenched in a soluble quenching oil; then tempered for 30 minutes at 400 to 450 degrees Fahr., in tempering oil. The small water pump crank is of 0.35 per cent carbon open-hearth steel, drop-forged and heat-treated in the rough. The quenching heat is 1520 degrees Fahr. and tempering 700 degrees in an open furnace for one hour.

The water pump crosshead pin is of 0.20 per cent carbon open-hearth steel. The threads are copper-plated, then the pins are carburized in hydro-carbonated bone black at 1600 degrees Fahr. for 10 hours, quenched from the box into soluble quenching oil, reheated to 1420 degrees Fahr. and quenched in brine. A light tempering of 350 degrees Fahr. for 20 minutes is then given in tempering oil.

The water pump connecting rod is similar in material and treatment to the large connecting rods.

The stanchions upon which the cylinders are mounted are of 0.30 per cent carbon open-hearth steel, drop-forged

and heat-treated in the rough. They are heated to 1575 degrees Fahr. in an open furnace and rolled into the oil bath to cut down quenching warpage, then tempered to 900 degrees Fahr. for 1½ hours in an open furnace. The specified minimum tensile strength on these is 65,000 pounds per square inch, and they must stand being bent double on themselves, cold, under a steam hammer. Their actual strength as treated is about 70,000 pounds per square inch.

A number of stanchion braces, brackets, levers, etc., of 0.20 per cent carbon open-hearth steel have a typical heat-treatment of 1500 degrees Fahr. in an open furnace, are quenched in soluble quenching oil and tempered at 900 degrees Fahr. in an open furnace for from 1 to 1½ hours.

The camshaft drive is through a bevel gear train; the vertical shaft and pinion is a drop forging of 0.30 per cent carbon 3½ per cent nickel steel. It is heat-treated in the rough by heating to 1650 degrees Fahr., in soluble quenching oil, drawing back at 1350 degrees Fahr. in the furnace, and cooling in the furnace. After machining, it is carburized in quick light carburizer at 1600 degrees Fahr. for 12 hours, in large boxes, quenched from the box in soluble quenching oil; reheated to 1500 degrees Fahr. in a lead pot, quenched in soluble quenching oil, reheated to 1360 degrees Fahr. in a lead pot and quenched in soluble quenching oil. The tempering treatment is 375 degrees Fahr. in tempering oil for 45 minutes.

The camshaft bevel gear is a 0.20 per cent carbon open-hearth steel forging. It is heat-treated in the rough by heating to 1650 degrees Fahr., quenching and tempering at 1350 degrees Fahr., the same as the vertical shaft and pinion. After machining, the center recessed part of the shaft hole, also the keyway are plugged with fireclay and the gears packed two-high in tall round boxes, teeth down. They are carburized in carburizer at 1600 degrees Fahr. for eight hours, quenched from the box into soluble quenching oil, reheated to 1550 degrees Fahr., quenched from the box into soluble quenching oil; reheated to 1550 degrees Fahr., quenched down in soluble quenching oil, reheated to 1440 degrees Fahr., then quenched teeth down in water and tempered 375 degrees Fahr. in tempering oil for 45 minutes.

This gear and the vertical shaft pinion must give a scleroscope reading of 65 to 75, finished.

Cams a Hard Proposition

The cams, of 0.20 per cent carbon open-hearth steel, are a very difficult proposition on account of several having a recess in one end which leaves a wall ⅛-inch thick. This thin section is on the hub, where the roller rides and adjoins a section ⅞-inch thick. To overcome breakage, the holes, in the process employed at first, were plugged with fireclay and bent wires stuck into the plug to hold a cap of fireclay on the ends. This was not altogether successful, so the cams are now strung on closefitting bolts, four or five to a bolt. The heads of the bolts are fitted to the cams, as is also a washer at the threaded end. The ends of the cams are covered with a mixture of kaolin and sodium silicate to form a paste; they are then strung on and the bolt and nut are tightened. This keeps the action of carburizing gas out of the holes entirely.

The bolted cams are carburized for 12 hours at 1600 degrees Fahr. and quenched from the box into soluble quenching oil. They are left on the bolts, reheated to 1440 degrees Fahr., and quenched in brine. They are then removed from the bolts and tempered for 30 minutes at 350 degrees Fahr. in tempering oil. The cams are finished before hardening, which means that they must not go out of shape in heat-treating, nor be roughened up. This treatment brings them out in fine shape and meets the requirements of 70 to 80 scleroscopic hardness.

Cam rocker lever rollers are of 0.20 per cent carbon open-hearth steel. They are carburized for 10 hours at 1600 degrees Fahr. in quick light carburizer, quenched from the box into oil, reheated 1420 degrees Fahr. and quenched in brine. After grinding they must show a scleroscopic hardness of 70 or over.

The roller pins are of screw stock. They are copper-plated on the ends and carburized in hydro-carbonated bone-black carburizer for eight hours at 1600 degrees Fahr., and quenched from the box into water. They must be file hard on the body and be soft enough to rivet over on the ends.

The cam rocker levers are cast vanadium steel. After annealing and machining they are heated for 40 minutes in cyanide at 1450 degrees Fahr. and quenched in water.

Besides these parts there are a number of others which have typical treatments. The only one of interest is the igniter plug finger. This is a drop forging of 1½ per cent nickel, 0.80 per cent chromium, 0.20 per cent carbon steel. It is heat-treated in the rough by heating to 1650 degrees Fahr., quenching in soluble quenching oil and tempering to 1350 degrees Fahr. After machining, the threaded and squared end is copper-plated. The carbonizing is done in hydro-carbonated bone black carburizer at 1600 degrees Fahr. for seven hours. They are quenched in soluble quenching oil from the box; then very slowly reheated to 1520 degrees Fahr. and quenched in soluble quenching oil; again very slowly reheated to 1360 degrees Fahr. and quenched in oil; tempered in tempering oil at 360 degrees Fahr. for 20 minutes.

These quenches are all in a tank of soluble quenching oil kept at from 80 to 90 degrees Fahr.

The igniter finger is a delicate part and caused no end of trouble for several weeks at the plant where the foregoing practice is followed. The material was changed and treatments of all sorts were tried out. Finally the method here given was hit upon and it met all the requirements under the most severe tests.

How to Select Steel for Small Tools

PROPER selection of steel entering into the manufacture of small tools and its heat treatment is of vital importance at the present time when millions of small tools are used in producing many of the necessities of modern warfare. That manufacturers realize this fact was evidenced by the large attendance at a recent meeting of the Cleveland Engineering society, Cleveland, where the subject for discussion was "Practical Methods of Heat Treatment of Small Tools". Discussion was general.

J. V. Emmons, metallurgical engineer, the Cleveland Twist Drill Co., Cleveland, presided over the meeting. In his opening remarks he laid stress on the fact that the manufacturer must learn first to select the proper grade of steel for a given product or heat treatment will prove of little value. Mr. Emmons, in discussing the composition and uses of carbon steels, emphasized that while a steel containing 1.5 per cent carbon was excellent for making such tools as reamers, it was not suitable for tools such as drills which require a slightly tougher steel—1.25 to 1 per cent carbon. It was further explained that other tools such as hammers and chisels, required a steel having a still lower percentage of carbon. For delicate tools, oil hardening steels were strongly recommended owing to the fact that the cost of labor involved in making many intricate tools practically prohibits the use of a water-hardening

steel where the loss from fire cracking is heavy.

Owing to the fact that labor is exceedingly scarce at the present time, care should be exercised in the selection and heat treatment of steel because the kind of labor now available is not as efficient as formerly. In other words, the human element leads to a higher percentage of blunders than it did before the war.

The first inspection of steel, Mr. Emmons said, should consist of a preliminary examination of the external appearance. By this method cracks, laminations, laps and seams can often be detected. It was stated that external tests alone should not be relied upon as this method is often deceptive.

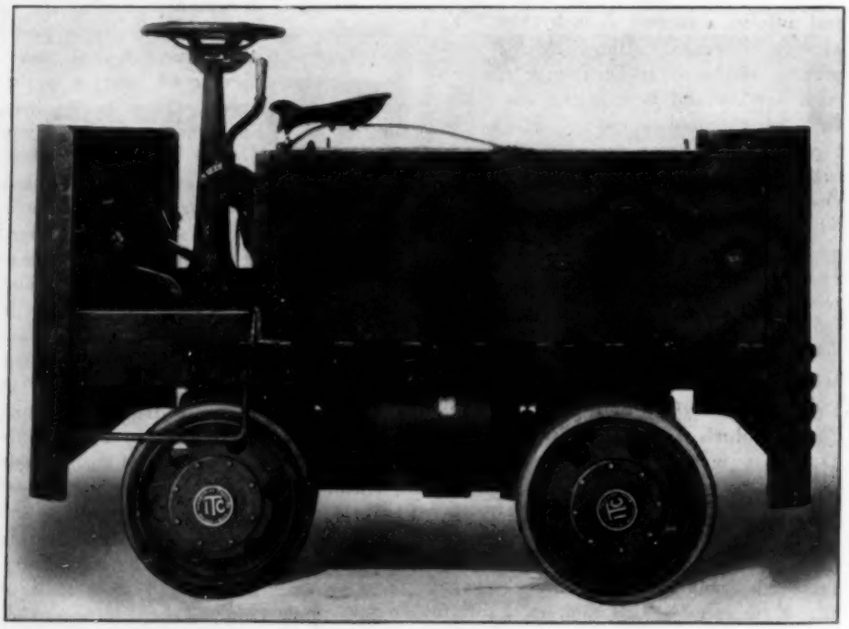
A good means of testing, it was said, was by the hardened fracture method. By this means such defects as overheating at the mills, or too deep a scale or bark may be readily detected. In the latter case the decarbonization of the outer shell is easily detected when it is necessary to have the outer portion of the finished product hard, enough stock for finishing should be allowed to remove the decarbonized portion. Inspectors were urged to be on the lookout for too much graphite in annealed steel.

Another factor that often caused trouble, it was explained, was mixed shipments from the steel mill. A consumer buying a hundred bars of tool steel might find a few bars of a low carbon or machine steel or, in rare instances, a bar of high speed steel. Mixed shipments should be tested by the spark method. The inspector should study the sparks thrown off by different steels when brought in contact with the grinding wheel until he can readily recognize any kind of steel by its sparks. Thus, machinery steel gives off plain yellow sparks with but few stars while the sparks from high carbon steel contain many stars. High speed steel, or any steel containing tungsten, throws a dark-red spark with no stars.

By far the most efficient means of testing steel, Mr. Emmons stated, is with the microscope. With its aid, once the inspector has mastered the subject, more can be ascertained concerning different specimens of steels than by any other method. To illustrate this point, numerous stereopticon views made from various steels were shown.

W. S. Bidle, metallurgist and president of the W. S. Bidle Co., Cleveland, next gave a short talk on tool design. He laid great stress on the fact that the manufacturer of tools should leave fillets wherever possible on work that had to be hardened. He further stated that neglect to look after this small detail caused the manufacturers of this country an enormous loss annually from the ruining of tools that were fire cracked in hardening. Mr. Bidle was asked what a man should do when fillets on hardened work were necessary, as in making blanking dies. Mr. Bidle thought that the best practice would be to use a nonshrinkable, oil-hardening steel. In making expensive tools, Mr. Bidle stated it was of the utmost importance to find from the maker of the steel the proportion of carbon contained and in subsequent heat-treating processes to be governed accordingly. The manufacturer should not take snap judgment on steel.

W. C. Whyte, president of the Steel Improvement Co., Cleveland, stated that many small manufacturers know but little concerning the heat treatment of steels. This lack of knowledge of fundamental principles often led to serious difficulties in trying to make machine parts conform to certain specifications. He said that the small manufacturer must be thoroughly educated to the importance of heat treatment, owing to the fact that the war has brought about exacting conditions.



HEAVY-DUTY TRACTOR STEERED BY ALL FOUR WHEELS

Builds Heavy-Duty Tractor

A tractor for intermill service has recently been placed on the market by the Industrial Truck Co., Holyoke, Mass. The tractor is made in two types with end control and center control respectively. The frame is built of channels. The bumpers are heavy boiler plates which are bent on the corners and riveted to the frame. The couplers are of the 3-step type to accommodate the different heights of trailers.

The battery boxes are provided with side doors which are easily removed when changing batteries. The boxes are also provided with hinged top plates which may be lifted whenever it is necessary to flush or inspect the batteries. By removing four nuts, the frame and battery boxes may be lifted from the chassis leaving the driving mechanism exposed for inspection or repairs.

Power is transmitted from the motor through a single reduction worm and gear to a differential. The latter transmits the power to the wheels through a universal joint which operates at a minimum angle of 43 degrees. The universal joint is enclosed in a dust-tight case formed by the pivoting-wheel knuckle and its supporting yoke. Two separate brakes are provided. The one operated by the left foot is the emergency and the other, operated by the right foot, is the service brake. All brake rods are adjustable.

The design of the tractor embodies many safety features. To operate the machine the driver must be sitting in his seat with his left foot pressing down on the emergency brake pedal. Each time his left foot is lifted from this pedal, the brake is applied and by means of a clutch on the controller shaft, the control lever is thrown into a neutral position. The steering wheel is of the tilting type. This arrangement is interlocked with the controller-shaft clutch and under no circumstances can the current be applied except when the wheel is in correct operating position.

Ordnance Tools Present Problem

Present Facilities Are Inadequate to Supply Machine Tools Needed Unless Non-essentials Are Eliminated—Engineering Advice to Ordnance Contractors is Urgently Requested

BY COL. H. W. REED

WHEN problems of such magnitude as are arising today come up for action, it is impossible to handle them through the recognized channels of peace times; and so the ordnance department has, in the the past, frequently called upon machine tool manufacturers for assistance not only in expediting the delivery of machine tools so urgently required, but also in determining the requirements of the machines necessary to build certain types of ordnance.

Frequently, it has been necessary to send out hurry-up calls to machine tool manufacturers for the loan of certain of their engineers to assist the ordnance officers in analyzing some new type of ordnance so as to determine the kind and number of tools required in each instance.

Recognizing the attitude of co-operation, that the machine tool builders have always shown, each of the several calls made was sent without regard to the inconvenience that it may have caused in giving up the services of important engineers for this work. It was felt by the department that the best results could be accomplished if a tentative schedule was made of machine tool requirements for some of the most important types of ordnance.

Engineering Assistance Valuable

By preliminary time-study work, it is safe to say that several million dollars worth of unnecessary machine tools was saved. This relieved to a some extent, the tense machine tool situation that existed last Fall.

Although comparatively few builders were called upon for this work, the prompt response made by those few reflects the spirit of the industry. The department takes this opportunity to extend appreciation for the assistance given during those trying days when the production sections were being organized.

Before giving the machine tool requirements of the ordnance department for its large gun program, there are a few general conditions that I have been instructed to bring to attention. The question often has been asked: How best can the machine tool builders serve the government? This may be answered broadly by stating that builders can best serve by turning out machine tools in the quickest possible time. There are, however, so many phases of the problems to be considerd that I will enumerate, in their order of importance, the specific ways in which manufacturers can best serve the ordnance department. In frankly stating what the department expects, these statements should not be considered as criticisms of present work. The ordnance department recognizes the wonderful work which has been performed and the request for a greater effort is based on the knolwedge of past work. I may add that if all branches of industrial manufacturing had come through as the National Machine Tool Builders association, we would be further on our way today.

The ordnance department asks a greatly increased production of large machine tools. The reply will be that manufacturers have reached their limit; if such is the case, then they must remove that limit, because the success of the program for large guns depends upon the output of heavy machines for the balance of the year. In other words, the success or failure of the 1919 drive, as far as the use of large caliber guns is concerned, rests squarely upon the manufacturer's shoulders, and they are expected to carry that load. The machines available are insufficient, and based upon reliable information, it is understood that unless the present rate of output for large machine tools is considerably increased, the program for large guns will be jeopardized.

Therefore, the first requirement expected is an increased output of large tools of a type that will produce large ordnance, and steps must be taken to insure an increase over the present output.

The procedure to be followed to secure this increased output is part of the burden of the war. The members of the National Machine Tool Builders association are in the best position to work out a successful plan to produce the required machines, and to that end are asked to co-operate with the machine tool section of the war industries board to determine how the results can best be obtained.

Find the Government's Needs

Thus closer contact should be maintained between the machine tool association and the machine tool section of the war industries board, so that the members of the association can, at all times, be fully informed as to the requirements of all branches of the national government.

Certain machine tool builders have in the past, strictly adhered to certain types and sizes of machine tools, and have enjoyed a national reputation as the manufacturers of these tools. The time has arrived for some of these manufacturers to change their commercial commodity. The time has arrived when it is not a question of maintaining past standards, but of manufacturing types of machinery that will do the most good.

A manufacturer who is equipped for

The Narrowing Road

BUSINESS-AS-USUAL fell by the wayside early in the advance of American industry toward war-production. The will to win has brought about this sacrifice to serve the ultimate aim of victory. In the ever-growing power of that determination which is to demonstrate the unfailing success of force to the utmost, private commercial interests gladly are meeting every sacrifice asked. In that narrowing defile through which all industry is driving forward, there is no room for the nonessential. Steel and iron took the first decisive action in the pledge of 100 per cent output for government needs. The machine tool interests are facing a similar decision. Col. H. W. Reed in the accompanying article states in plain words that the time has arrived when the builder must concentrate on tools needed solely for war purposes. Failing in the ability to meet the ordnance tool requirements, the manufacturers are requested to engage in munitions production. The nonessential machine tool will be an early casualty.

Abstract of an address by Col. H. W. Reed, ordnance department, delivered at the meeting of the National Machine Tool Builders association, Atlantic City, N. J., May 16, 1918.

making certain machine tools for which there is no urgent demand by the government, should immediately take steps to devote his energies to some type of machine for which there is a demand. If his equipment is such that he cannot change to some other type of machine tool, then it is his duty to inquire into the needs of the ordnance department to determine the material for which he is equipped and for which there is an urgent demand.

The machine tool section of the war industries board should be able to advise as to the advisability of changing from machine tools to straight ordnance manufacturing, provided equipment is such that it would be impossible to produce machine tools which the government really requires. It is felt that with the machine tool section of the war industries board acting as the intermediary between the ordnance department and the machine tool builders, an alliance can be formed between these two bodies that will be extremely beneficial to both. It should be remembered, however, that builders should be in the frame of mind to accept the board's decision as to what can best be built to suit the government's needs, and not what would suit the convenience of the manufacturer.

Engineering Judgment Needed

It is suggested that far too little time is devoted by the machine tool manufacturers in assisting to secure the equipment that would best suit their requirements. During peace times, every progressive machine tool manufacturer would check up the requirements of his customers so as to be assured that each tool sold was the one best fitted for the customers' needs. This service has probably been discontinued to a certain extent, for two main reasons:

Due to the enormous demand for machine tools during the war period, it was not necessary for machine tool builders to solicit business; and therefore, they unconsciously discontinued their engineering services, which heretofore had been given to the operating departments of customer's plants.

Due to the general unfamiliarity of the country at large on the machine tool requirements for ordnance work, the machine tool builders have been loath to offer any suggestions as to what tools would be best fitted for the manufacturing of ordnance material.

Eliminate Wasteful Buying

The result has been, that all too frequently, equipment has been sold to manufacturers holding contracts for ordnance material which was not suited in any way for their needs. The vast amount of new material to be manufactured, and the difficulty in securing the proper personnel for the ordnance department, has made it practically impossible to check in detail, the machines required for all classes of ordnance material. Due to these difficulties, together with the lack of advice from machine tool builders, quite a large amount of machine tools have been delivered which are absolutely unsatisfactory.

Upon checking the machine tool list submitted by a contractor of the ordnance department recently, it was discovered that he proposed to buy 180 12-inch lathes. Had these lathes been purchased, it would have been impossible to use any of them on his contract. While this is an extreme case, it might frankly be stated that every government contractor would have been benefitted had the machine tool builders

ELECTRICALLY DRIVEN BENCH DRILL

in each case, co-operated to the fullest extent in advising the types and sizes of machines to be purchased.

Machine tool builders should realize that it was necessary to let contracts for ordnance material to manufacturers who have had little or no experience in the past on up-to-date machine shop practice. Therefore, manufacturers should increase the service heretofore rendered prospective customers in advising them as to what they should and should not buy.

Another important service in which the machine tool builders can assist the ordnance department is in driving the machine tool gypsies out of business. It should be remembered that the ordnance department must defend the prices paid for the machine tools purchased by the government for their contractors. This may be difficult in a few cases, as the prices on certain machine tools, especially second-hand ones, have been run up to an amount out of all reason, due to one or more wash sales. Transactions of this kind reflect discredit upon the tool industry as a whole, even though those who are well informed realize that actions of this kind would not be tolerated by the association. Manufacturers and legitimate sales agents must use their influence toward the elimination of the perincious activities followed by this class of men.

Ordnance Requirements

Quoting from a letter from G. E. Merriweather, chairman the machine tool section of the war industries board, the present requirements of the ordnance department for machine tools may be stated as follows:

Briefly stated, the American machine tool industry is apparently well able to cope with all the demands that may be made on it for small and medium size tools up to approximately 24-inch lathes; 24-inch planers; 36-inch vertical boring mills; radial drills up to 4 foot swing; all small drill presses, turret lathes; automatic screw machines, surface grinders, etc. There is, however, much evidence of a dangerous shortage of planers, lathes, slotters, vertical and horizontal boring mills, radial drills, milling machines, of sizes larger than those specified above. The reasons for this statement are sufficiently obvious.

Sensitive Bench Drill

The electrically driven, sensitive bench drill shown in the accompanying illustration, was recently developed by the Wisconsin Electric Co., Racine, Wis. The motor is directly connected to the spindle. The motor is of the variable speed type and affords six speeds ranging from 500 to 10,000 revolutions per minute. The controller is mounted on the floor and is operated by a foot pedal.

The platen is adjustable and affords a stroke of ½ inch through the medium of the hand lever at the right of the machine. The drill is said to be adapted for drilling steel, cast iron, aluminum, brass, fiber, hard rubber, etc. It has a capacity up to 1/16 inch in steel and ⅛ inch in soft alloys. Holes can be drilled in the center of a 5-inch circle. The motor and chuck are balanced dynamically to insure smooth running.

The United Electric Light & Power Co., New York City, has recently placed an order with the Westinghouse Electric & Mfg. Co. for a 22,000 kilowatt turbo-generator set. The generator will be rated at 25,900 kilovolt-ampere, at 85 per cent power factor, 8000 volts, 3-phase 62½ cycles. It will be direct-connected to a Westinghouse 22,000 kilowatt turbine. The order includes a 40,000 square foot surface condenser and auxiliaries.

Builds Massive Tools For War Work

Electric Drives and Centralized Control Are Features of a Massive Boring Mill and a Set of Heavy Duty Bending Rolls Recently Built to Expedite the Government's War Program

TO manufacture the necessities of modern warfare in the shortest possible time, calls in many cases for heavy machine-tool equipment in sizes which were unheard of a few years ago. Under the spur of war needs, machine-tool manufacturers all over the country have bent their efforts toward producing more efficient tools and as a result many machines involving interesting features have been developed.

A good example of modern, heavy machine-tool construction is shown at the right of the accompanying illustration. This is a 28 to 42-foot extention boring and turning mill recently built by the Niles-Bement-Pond Co., New York, for arsenal work.

The housings of this machine slide on ways which permit the maximum swing when occasion requires. A separate 15-horsepower motor is used to traverse the housings. With the housings in their forward position, the machine will swing 28 feet 2 inches and when the housings are set as far back as possible, a swing of 42 feet 4 inches can be obtained.

The table is designed safely to carry a load of 300,000 pounds in addition to its own weight. A 60-horsepower motor rotates the table through the medium of a diametrically opposed, double-pinion drive.

The crossrail is of heavy section, 48 inches wide and 54 inches deep, built to withstand severe strains. The maximum height under the tool holders is 10 feet while the tool bars have a travel of 84 inches. The crossrail is elevated and lowered by means of a 25-horsepower motor and is equipped with two heads carrying octagon-shaped bars which measure 10 inches across the flats. The crossrail heads are provided with platforms for the operator. The adjustment of feeds and the rapid traversing of the bars and saddles by means of a 15-horsepower motor, is controlled from these platforms. The operator on these platforms also has control of the main driving motor, although this motor can also be operated from stations at each side of the machine. All motors are controlled by push buttons.

Plate Bending Rolls

Another example of modern, heavy machine-tool construction was recently developed by the Niles Co. at its Hamilton, O., works. This machine, which is shown at the left of the accompanying illustration, is a set of bending rolls of the strong-back type having the capacity to roll mild steel plates 1 inch thick and 36 feet long, or 1¼ inches thick and 30 feet long.

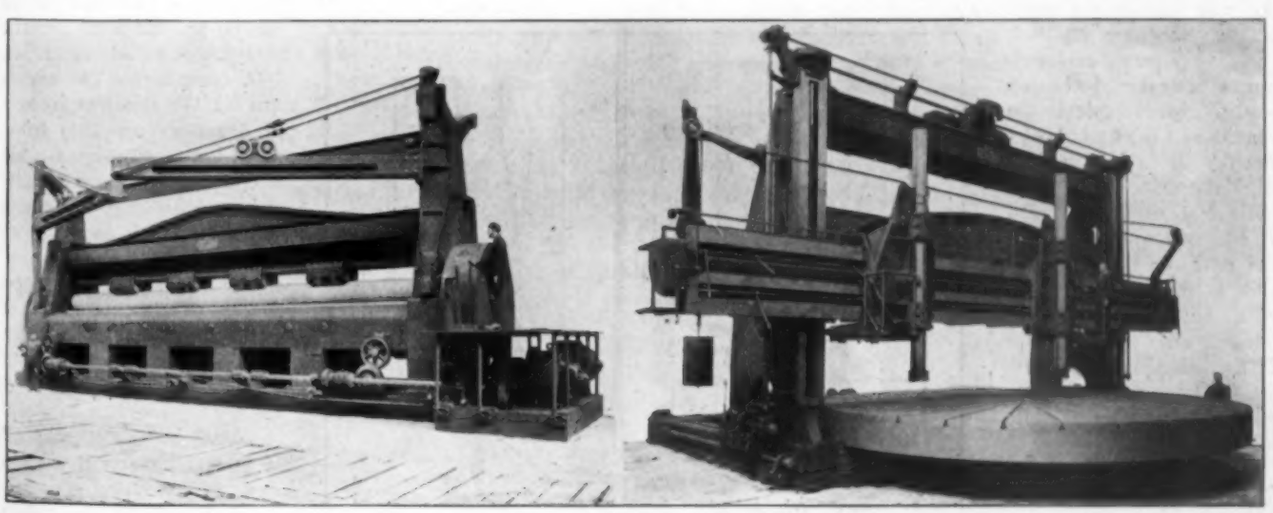
The machine consists of two massive cast iron housings which are joined at the top by two 20-inch I-beams and below by two heavy cast iron side frames. Rolling is accomplished by three forged steel rolls, one upper roll and two lower rolls. The lower rolls are 36 feet 9 inches long and 16 inches in diameter. They are supported by eight pairs of supplementary rolls, arranged four pairs on each side.

The upper roll is 36 feet 9 inches long and 19 inches in diameter. It is reinforced by a heavy, built-up steel girder, carrying on its under side four supporting roller bearings which are directly over those supporting the lower rolls. The rolls are driven by a 100-horsepower motor.

The girder and upper roll are raised and lowered by means of steel elevating screws which are placed one at each end of the machine. These screws are operated by a 75-horsepower motor and the arrangement is such that both screws can be turned simultaneously or independently.

The motors are placed at one end of the machine and over them is built the operating platform. The whole set of controlling levers are grouped together at this station so that the motor controllers, reversing and clutch levers, can be operated by one man from one position on the platform.

To facilitate the handling of heavy material, the machine is equipped with four, top-braced jib cranes, self-contained with the machine. The posts for these cranes are set at the four corners of the machine and the lower thrust of each crane is fully equipped with ball bearings.



AT THE RIGHT IS A MASSIVE BORING MILL BUILT FOR ONE OF UNCLE SAM'S ARSENALS. THE MACHINE AT THE LEFT IS A SET OF HEAVY BENDING ROLLS FOR SHAPING HEAVY STEEL PLATES

High Velocity Air and Gas Washer

New Apparatus Based Upon Both Spray and Centrifugal Action—Washer is Designed to Handle a Large Volume Through the Application of High Velocity—Machine is Small in Size

BY JOHN L. ALDEN

A NEW type of air and gas washer has been developed within the past 18 months, which offers a number of advantages over the existing types. With the new apparatus the washing can be continued to any desired degree of cleanliness, and the washer will handle unusually large quantites of dust or long fiber without clogging, owing to its large passages and the absence of eliminators. Due to the high washing efficiency, the water consumption is low, from 1 to 2 gallons per 1000 cubic feet of air being needed. The washer is extremely small and compact, and of light weight. A 10,000-cubic-foot washer is about 5 feet long, 5 feet in diameter, and weighs less than 400 pounds. The term "air" is used in the discussion preceding and following to include any gaseous fluid or vapor for which cleaning apparatus may be found necessary.

Gas scrubbers normally operate at a velocity of about 90 feet per minute and air washers at from 400 to 500 feet per minute, while with these devices the limiting velocity for good washing and a reasonable frictional resistance is about 1000 feet per minute. The washer about to be described operates habitually at from 2000 to 5000 feet per minute. As the efficiency of air cleaning in this type increases rapidly with the velocity, the only limit to the latter is the resistance imposed. Fig. 1 represents a longitudinal section of the air washer which meets the conditions previously stated. A helical passage is constructed within a horizontal drum, provided at one end with a tangential inlet for the dirty air, and at the opposite end with an outlet for the purified air. That portion of the helical passage nearest the inlet constitutes the washing chamber, while the remainder comprises the eliminating element. On the inner wall of the helical duct are suitable spray nozzles which spray across the column of air. Depending upon the amount of dust to be removed and the completeness of washing desired, the air makes from 1¼ to 5 screwlike revolutions in passing through the helix from inlet to outlet. For fairly dusty air or for the ordinary dust-collecting system, two turns are sufficient. The whole or a portion of the first turn is used for washing while the last turn is employed for the elimination of the free moisture.

The washer described in this article makes use of both spray and centrifugal washing, with the greater dependence placed upon the latter. As the dust-laden air enters through the tangential inlet pipe it is thoroughly wetted by the mist of the spray chamber. Much of the coarser dirt is removed by the direct action of the spray. As the air is whirled through the helical conduit a large proportion of the remaining dust is thrown against the wet curved side of the washer, flowing off to the drain with the spent wash water. The extremely fine dust still remaining cannot be caught by ordinary means, for it is too light to be separated by centrifugal force. However, a considerable amount has been exposed to the mist to such an extent that, although not actually wet, its specific gravity has been increased by the moisture to a degree which will permit its removal by centrifugal force. Thus, an unusually high proportion of the dust content is removed.

After the washing operation the air passes through the eliminating portion of the washer, where it is freed of the suspended moisture. The elimination of water drops is accomlished by centrifugal action, exactly as the dust itself was removed. It is unnecessary to introduce into the washer any form of eliminator plates.

The high washing efficiency gained presents two possibilities, either of which is advantageous. Extreme dust conditions may be met, or, street air may be washed for ventilating purposes with an unusually small amount of water. One of the smaller sizes of these washers handles 4000 cubic feet per minute of dusty air from a dust-collecting system, and from 50 to 100 pounds of mud is removed daily from the strainer basket. From four to six gallons of water per minute wash this dirty air to a sufficient degree of cleanliness to permit it to be returned to the room. While no measurements have been made of the dust content, this air seems fresh and pleasant and has no dusty odor. These results, obtained from a practical commercial washer show that air sufficiently dirty to show a decidedly smoky dust cloud can be washed with from 1 to 1½ gallons of water per 1000 cubic feet. The standard washer requires from 4 to 5 gallons per 1000 cubic feet to successfully wash air which is initially much cleaner than that on which the centrifugal washer was tested. Where it is impossible to re-circulate the wash water, the economy in water alone is an appreciable item. For a machine to handle 10,000 cubic feet of air per minute, this amounts to 20,000 gallons per day of 10 hours. Greater thoroughness in removing dust is accomplished by increasing the number of turns of the helical washing space. Thus,

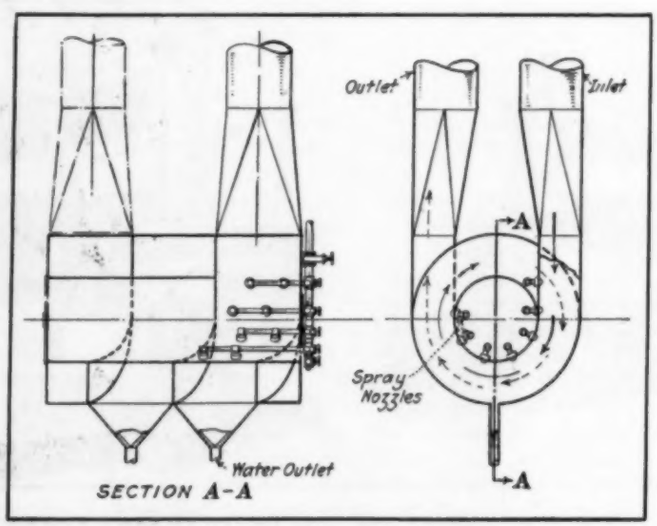


FIG. 1—CENTRIFUGAL AIR WASHER SHOWN IN SECTION

From a paper to be presented at the June meeting of the American Society of Mechanical Engineers. The author, Lieut. John L. Alden, is in the ordnance department at Washington at the present time.

for ordinary ventilating purposes, one to two turns are sufficient; for dust collecting, 1½ to three turns; while for extremely fine dust, from three to five or more turns must be used. The economical limit is probably about five or six turns, or convolutions. The overall length, as determined by the number of turns of the screw-shaped conduit, depends, therefore, upon the degree of purity of air desired, and to a much less extent upon the relative arrangement of inlet and outlet. The outside diameter, on the other hand, depends upon the air volume. Since centrifugal force plays an important part, the size of the washer is greatly reduced because the efficiency increases as the diameter decreases. In addition, the efficiency increases rapidly with the higher air velocities. Both factors tend toward the production of a small, compact washer. The reason is evident from the expression for centrifugal force:

$F = mv^2/r$,
v = air velocity, feet per second,
r = radius, feet,
and m = mass.

Thus, if satisfactory cleaning is done with a washer of 2 feet mean radius of the washing chamber at 3000 feet per minute, velocity, an 8-foot washer would require a velocity of 6000 feet per minute to give equally good cleaning. It is therefore desirable to make the diameter of the washing drum as small as possible and at the same time use as high a velocity as is consistent with a reasonable friction loss. Owing to the fact that with increased diameters higher air speeds must be used to give the same cleanliness, it is probable that the practical limit of size for ordinary air washing is between 15,000 and 25,000 cubic feet per minute. High-speed air washers may be built in sizes as small as 100 cubic feet per minute, but both the upper and lower limits of size may be extended to meet unusual requirements.

Washer is Self-Cleaning

It is difficult to clog the centrifugal air washer with dirt and refuse, owing to the large passages and to the absence of eliminator plates or other obstructions. It is unnecessary to interpose between the washer and the source of dust any form of dust collector or rough washer. Since the dirt and water are removed at each convolution of the helix, there is no accumulation of water and material to be re-entrained by the air current. This is an essential feature where the centrifugal removal of free moisture from a high velocity current is attempted.

With the air flowing through a rectangular passage, it is desirable to throw a flat spray of water across the channel. After considerable experiment with a variety of forms, the nozzle shown in Fig. 2 was designed to fulfill these requirements. The spraying tip is part of a removable plug containing two holes designed to throw opposing streams. The impact of the jets forms a flat sheet of spray at right angles to the plane of the holes. Although this spray is quite fine, much of it is further broken into mist upon striking upon the opposite wall of the washer. Locating the spray nozzles upon the inner wall of the chamber makes it necessary for all of the dirty air to pass through this fog-filled passage.

The pressure loss through the washer is from ⅛ to 1 inch of water, depending upon the conditions governing the design. The variables to

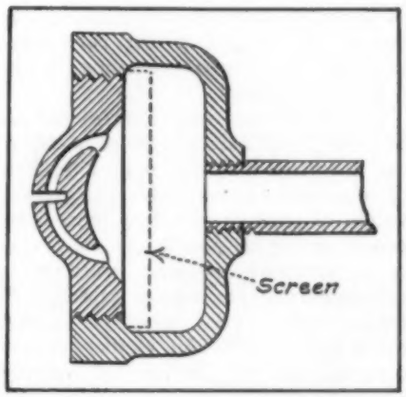


FIG. 2—SPARY NOZZLE FOR USE IN AIR WASHERS

be considered are the diameter, the cross-sectional area and proportions of the washing space, the velocity, the number of turns of the helix, and the volume of water per square inch of the sectional area of the washing chamber. Ordinarily, this washer can be designed for ventilating work with a resistance of about ¼ inch of water. Where the dust requirements are more severe, demanding higher velocities, more wash water and a greater number of convolutions of the helix, the loss will be somewhat greater.

Two washers of this design in operation are reported by the owner to be in successful operation. Each of them has a capacity of 15,000 cubic feet per minute, and was designed to hang from the ceiling with 7 feet of headroom beneath. This type of washer was designed and developed for a specific job, that of washing the clouds of dust from the fan blast of dust-collecting system, leaving the air fit for breathing. Owing to the similarity of refined dust washing and blast-furnace-gas scrubbing, an investigation of the adaptability of this washer to gas cleaning would be valuable and interesting at this time.

Book Review

Principles, Operation and Products of the Blast Furnace, by J. E. Johnson, Jr.; cloth; 551 pages, 6 x 9 inches; first edition, published by McGraw-Hill Book Co., and furnished by THE IRON TRADE REVIEW for $5 net.

This book is divided into four parts, the first of which deals with chemical, thermal and mechanical principles. The author has developed these principles in such a way that they not only agree with present-day practice, but each one merges into the other with only an arbitrary dividing line between. The reactions between carbon, oxygen, and iron and its oxides and the reactions which lead to the formation of slag are fully discussed. The heat production and consumption in the hearth and shaft are calculated from operating data. Twenty-two pages are devoted to Gruner's "ideal working" theory and many calculations are found in the discussion. The subject of the cause and function of blast pressure in the chapter which deals with mechanical principles, is thoroughly analyzed.

Part II is subdivided into 10 chapters. It deals with the sequence of raw materials as they descend and of gas as it ascends; fuels in the order of their importance; slags; burden calculations from the standpoint of the raw materials charged and the production of the kind of iron to be made; the distribution of the charge column and of the ascending gas column; the rate of driving; casting and flushing the furnace, blowing in, blowing out and banking; furnace irregularities and treatment; and the combustion of furnace gas together with a description of the various types of burners which are now operating with good results.

The products of the blast furnace which depend solely on the chemical composition are discussed in Part III. This section of the book is subdivided into four broad classes which in the order of their importance and tonnage produced, are steel-making, foundry and puddling irons, and ferro-alloys. The last chapter in the book deals with the commercial consideration and future possibilities and is not only of interest to the owner and the investor, but to the higher employes as well. This volume is useful to the furnace builder, the student, or anybody who is interested in the efficient operation of blast furnaces.

Heavier Loading of Cars Advocated

Many Millions of Dollars Saved Annually by Utilizing Railroad Cars to Fullest Capacity—Improvement in Car Supply is Thereby Effected—100-Ton Units for Bulk Loads Promised

BY J. F. TOWNSEND

A MARKED improvement has been noticed in transportation, at all the steel producing points, located in the Pittsburgh, Cleveland, Youngstown, Buffalo and Chicago districts, with the more favorable weather conditions, but with the opening of navigation on the lakes, the demand for equipment to supply coal mines with cars for lake coal has been increased. The demand for a greater number of cars required to move the largest shipments of iron ore that the country has ever had, makes it plain to those in touch with the situation that there will be little improvement in the car supply, unless the shipping public can be aroused to a full appreciation of this serious problem and give their co-operation toward the utilization to the fullest capacity of all cars.

While there have been great strides made in the adoption of modern railroad cars of large capacity and improved methods for heavier loading of cars, the increased volume of traffic that the railroads are confronted with today has far exceeded the most advanced plans of the railroads to provide adequate facilities for the natural increase in the general business.

The railroads have grappled with the situation in a heroic manner. They attempted to handle the traffic which was sufficient to support nearly twice the number of railroads that we have today, or, at all events, twice the facilities and rolling stock in the section of the country east of the Mississippi river. If shippers will do their part toward utilizing equipment to the fullest extent and consignes unload all cars promptly at the destination, they will do much toward clearing up this situation.

Building Larger Cars

Last year a new 85-ton hopper car was constructed by the Pennsylvania railroad at its Altoona shops; with the 10 per cent allowed above capacity, this car will carry 93½ tons. This means that the 100-ton car will soon appear. The compiled records show that the average carload throughout the United States is but 22½ tons, or substantially one-fifth the capacity of this monster freight car. The car is constructed with five drop doors, suitable for handling coarse material, such as iron ore, coal, coke and limestone, all of which should be loaded to the full carrying capacity.

The Norfolk & Western has over 1700 200,000-pound steel gondola cars equipped with 6-wheel trucks. These cars are in regular service and are giving satisfactory results. The Virginian railway has four 120-ton steel gondola cars which were built during the last year for experimental purposes. These changes show that the adoption of a car of 200,000-pounds capacity for coarse bulk freight is not only practical but its general adoption would make for efficiency.

The 13 shipping companies of the U. S. Steel Corp. have conducted a vigorous campaign for the heavier loading of cars and during 1917 the average weight of material loaded by these companies was 88,300 pounds per car. This is a remarkable showing, when it is considered that the average capacity per freight car in this country is only 80,000 pounds, according to the statistics compiled by the bureau of railway economics. It is hard to realize this record of heavy loading when the average carload of material of all railroads throughout the country on all traffic, including the steel traffic referred to, was only 44,800 pounds. This is an average of 43,500 pounds per car less than the record made by the 13 shipping companies of the U. S. Steel Corp.

While the 13 shipping companies referred to, increased the average carload on outbound shipments during 1917 only 2900 pounds per car, there was effected an actual saving of 73,010 cars, as compared with the loading for 1916, when the average was 85,400 pounds per loaded car. This does not include the cars which were loaded to 50 tons and shipped by the Oliver Iron Mining Co. during that year; to include these would have tended to increase the average load but might have been considered misleading.

The saving, according to the basis used by the American Railway association in its compilation of Feb. 6, 1917, places the average earnings of a freight car at $2.50 a day, and using that method of calculation, i.e., multiplying 26,648,650, the number of idle car days, by these average earnings per day, it shows that during the year 1917 the railroads gained $66,621,625 in gross earnings on account of the heavier loading of cars. This also effected a saving of 73,010 cars, which were in other service.

The records also show that the 13 shipping companies actually forwarded 3,223,391 more tons of freight than if the practice of loading one year ago had been followed. This increased traffic was enjoyed by the railroads without any additional operating expenses.

According to the interstate commerce reports compiled for 1916, the average haul per ton of revenue freight of the individual railway throughout the country was 166 miles, and the loaded freight cars per train was 25 cars. On this basis, the railroads throughout the United States were saved 12,119,660 car miles, or an equivalent of 484,786 train miles; the 73,010 cars saved means that these cars were in other service and at the average freight revenue of 16.13 cents, the actual saving of the 73,010 less cars used, resulted in increased railroad earnings of $1,954,901.15 without any increased operating expenses.

During the last six years, the 13 shipping companies of the U. S. Steel Corp. have effected a saving of 275,908 cars through the heavier loading of equipment, a record probably unmatched in this country for the period referred to.

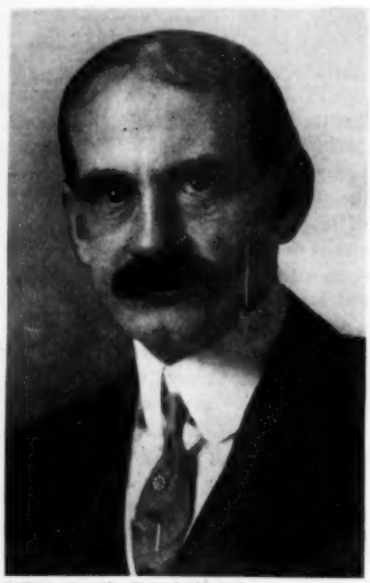
Shippers and consignes as well as the railroads have been greatly benefitted in the fewer number of cars switched and weighed, to say nothing of the relief of terminals and the great saving in operating expenses that would have been created had it been necessary to handle this additional number of both empty and loaded cars through the various classification and interchange yards of the railroads from point of shipment to destination.

The author, J. F. Townsend, is traffic manager for the National Tube Co., Pittsburgh.

Foundry Methods

Frank D. Chase, industrial engineer, 122 South Michigan avenue, Chicago, has issued a booklet containing the material and illustrations prepared for a lecture on "The Modern Foundry" before the Philadelphia Foundrymen's association and the Chicago Foundrymen's club. In it he treats of modern layouts for efficient handling of material and products, lighting, ventilation and ecenomical foundry materials.

Wide Range Covered in Institute's Program by Authorities in Their Respective Lines



T. W. ROBINSON,
Vice President, Illinois Steel Co., Chicago

KEEN interest was aroused by T. W. Robinson's paper which contains the first description ever made of the triplex steel-making process inaugurated at the South Chicago plant of the Illinois Steel Co. This plant embraces the largest electric furnace installation in the world. As first vice president in charge of operation, Mr. Robinson has devoted practically his entire time to the development of steel manufacture and during his affiliation with the Illinois Steel Co., for many years, he has become widely known. Undoubtedly he is one of the best informed men on steel plant operation in this country if not in the world. His literary contributions on this and kindred subjects are always enthusiastically received.

* * *

THAT chemistry is daily entering more and more into metallurgy is conclusive. Each succeeding discovery seems to demonstrate a wider latitude for further chemical research. On previous occasions, J. S. Unger has shown the monetary value of knowledge of the action of chemicals in iron and steel, and his technical papers on this subject are always preserved for guidance. His latest contribution is entitled, "The Effect of Phosphorus in Soft Acid and Basic Open-Hearth Steels." Mr. Unger is manager of the Carnegie Steel Co.'s central research bureau at Pittsburgh.

* * *

SINCE the beginning of the war, particularly since this nation's entry into it, the value of the by-product coke oven and its products has been appreciated and realized as never before. Great impetus has been given to this industry, which has taken what were at one time waste products and made them sources of revenue. W. H. Blauvelt, consulting engineer of the Semet-Solvay Co., Syracuse, N. Y., delivered an address on "The Modern By-Product Coke Oven and Its By-Products," which showed to what extent this branch of the iron and steel industry is depended upon for aid in winning the war.

* * *

ANOTHER conservation measure confronts the iron and steel industry. Upon the importation of manganese ores and alloys has depended in large part, the country's steel production. Curtailment of such imports makes necessary rigid conservation of manganese materials. C. R. Ellicott, who is superintendent of furnaces and mills at the Lehigh plant of the Bethlehem Steel Co., South Bethlehem, Pa., presented a paper which dealt with every phase of the subject. It is published in this issue.

* * *

TRADE journals at one time, were considered almost a necessary evil. Times change and trade journals change as well. Bertram S. Stephenson, who at one time was associate editor of THE IRON TRADE REVIEW in Cleveland and later in New York, spoke on the subject of the "Relation of the Trade Papers to the Iron and Steel Industry." Because in 1910 he became affiliated with M. A. Hanna & Co., at Detroit and latterly has been their resident manager at Pittsburgh, Mr. Stephenson is competent to deal with the subject of trade journals as they apply to industry

J. S. UNGER,
Manager, Central Research Bureau, Carnegie Steel Co., Pittsburgh

B. S. STEPHENSON,
Resident Manager, M. A. Hanna & Co., Pittsburgh

W. H. BLAUVELT,
Consulting Engineer, Semet-Solvay Co., Syracuse, N. Y.

The South Chicago Triplex Process

Bessemer Converters, Open-Hearth and Electric Furnaces Combined to Make High Grade Steel on a Quantity Basis—A Description of the New Plant at South Works

BY T. W. ROBINSON
First Vice President, Illinois Steel Co.

IT is a far cry from Benjamin Franklin expounding American democracy in the court of France to the maintenance of American ideals on the battlefields of Europe—yet the enlightening power of Franklin's statesmanship promises to pale into insignificance before the compelling force of the guns that are being produced through his genius in electrical discovery. Electric steel has played no unimportant part in the paths of peace. It is about to play a more important part in the theater of war.

This paper has to do with the triplex process of producing electric steel as carried out at the South Chicago works of the Illinois Steel Co., Chicago, a subsidiary of the United States Steel Corp. In the following survey, it has been the aim to leave the description of physical features of plant largely to illustrations and drawings, and to confine process reference to its most salient points. The technicalities of general plant design and the operation of the electric furnace have been ably presented before the American Iron and Steel institute by W. R. Walker, John A. Mathews, and others. The object of this paper will have been achieved if with a minimum of repetition, it supplements existing records with later developments, especially in connection with the manufacture of electric steel in relatively large quantities.

The development of electric steel at South Chicago was based upon the fundamental conception that the electric furnace was pre-eminently adapted to the manufacture of carbon and alloy steel of the highest quality; that it would be possible to produce electric steel in sufficiently large units to permit its use in heavy products; and that the increasing demand for high-grade steel would provide a sufficiently extensive market to make its manufacture commercially possible.

Under these promises, the Illinois Steel Co. in May, 1909, installed its first electric steel furnace at the South Chicago works. At that time there were only two other electric furnaces in this country concerned with the manufacture of electric steel—one at the Halcomb Steel Co., Syracuse, N. Y., and the other at the Firth Sterling Steel Co., McKeesport, Pa. The furnaces here and abroad were all small, running from a ton or less to five tons in capacity. Our installation consisted of a 15-ton basic-lined Heroult furnace with an electric equipment for 3-phase, 25-cycle, and 110-volt current. The manufacture of electric steel was a new art, and ours was a new adaptation of a new art. As to the troubles we encountered, I may say their name was legion. Perseverance conquered, however, and we soon had the satisfaction of producing a metal of unquestionably superior quality.

As the fundamental object was to demonstrate the opportunities of the new process in connection with heavy products, attention was early turned to the experimental manufacture of electric steel rails. Under the limitation of equipment, it was necessary to depart from standard rail practice to the extent of accumulating cold ingots and reheating them. The electric steel used was made from bessemer blown metal. We advisedly felt our way in chemistry. Ir-

A paper presented at the annual meeting of the American Iron and Steel institute, New York, May 31, 1918.

FIG. 1—REFINED METAL FROM THE OPEN HEARTHS IS POURED INTO THE ELECTRIC FURNACES FOR THE FINISHING OPERATION

regularities incident to incomplete equipment were unavoidable. In spite of pioneering difficulties, about 10,500 tons of electric steel rails were laid on 14 railroads throughout the country. The results of these rails in track indicated that electric and open-hearth rails of like chemical composition had practically the same resistance to wear when the former were made under the conditions that existed at the time of their manufacture. The failure from breakage was almost negligible, there were no interior defects, and the test showed that the electric steel was considerably more ductile at low temperature than either the open-hearth or the bessemer steel.

In order to further determine the facts, a series of experiments was undertaken with a view of testing the ductility of rail steel at low temperatures. A refrigerating plant was erected adjacent to our regular drop testing machine. About 900 pieces of electric, open-hearth, and bessemer rails of various sections were tested at temperatures ranging from 70 degrees above to 50 degrees below zero, Fahr. These tests emphasized that in the case of all the steel there was a marked decrease in resistance to shock as the temperature lowered. Relatively speaking, however, the electric steel was distinctly more ductile than either the bessemer or open-hearth.

During and after the period in which we were manufacturing electric steel rails, we were experimenting with such other heavy products as forgings, plates, axles, and structural shapes. Not only had carbon steel been made in relatively large quantities in connection with these productions, but the field of alloy steel had been comprehensively entered. Expanding demand led to the introduction in July, 1916, of a second furnace similar to the original one in electrical equipment and capacity. This gave a combined capacity of about 4500 tons of electric steel ingots per month.

By this time our experience had verified in a large measure the soundness of the views upon which our original electric-furnace installation was predicated. We had demonstrated that it was possible to produce electric steel in relatively large units without the sacrifice of quality. The physical characteristics of the steel had proved to be admirably adapted for heavy products. There was a growing demand for a superior steel for general purposes, and the call for alloy steels was rapidly increasing in connection with the automobile and other industries. Extent of market was largely a question of price, and price logically was largely a matter of cost.

Quality Safeguarded

In the meantime an addition to our open-hearth at South Works had become desirable, and in connection therewith the matter of increasing our electric steel capacity was taken under consideration. In studying this subject, we were naturally guided by our past experience. We had made electric steel by the melting of cold stock. We had refined in the electric furnace both molten blown bessemer metal and molten open-hearth metal. We also had made steel by the initial refining of bessemer blown metal in the open hearth, supplemented by final refining in the electric furnace. Part of this work was experimental in character. None of it was done under ideal economic conditions. The cost of producing steel in the electric furnace was vitally influenced of course by the amount of power used, and this and other conversion items were in turn largely influenced by the tonnage produced. Manifestly nothing could be considered that would sacrifice quality for output without destroying the very essence and reason for the electric process.

As electricity is an expensive metallurgical fuel, the melting of cold stock or the preliminary refining of metal in the electric furnace could be accomplished only at the expense of a comparatively high fuel cost. Our original practice was to make electric steel by refining bessemer blown metal. This process necessitated two distinct operations in the electric furnace, namely, dephosphorization by the use of an oxidizing slag, and deoxidization by means of a reducing slag. Steel of the highest quality can be produced by this practice, but there is obviously greater liability to irregularity in this method than when open-hearth metal is used from which the phosphorus previously has been eliminated. It is well to remember that the electric furnace while a highly efficient instrument, is far from foolproof. Several years' experience with the use of bessemer blown metal in the stationary open-hearth furnaces under the local conditions that existed had helped to demonstrate the advan-

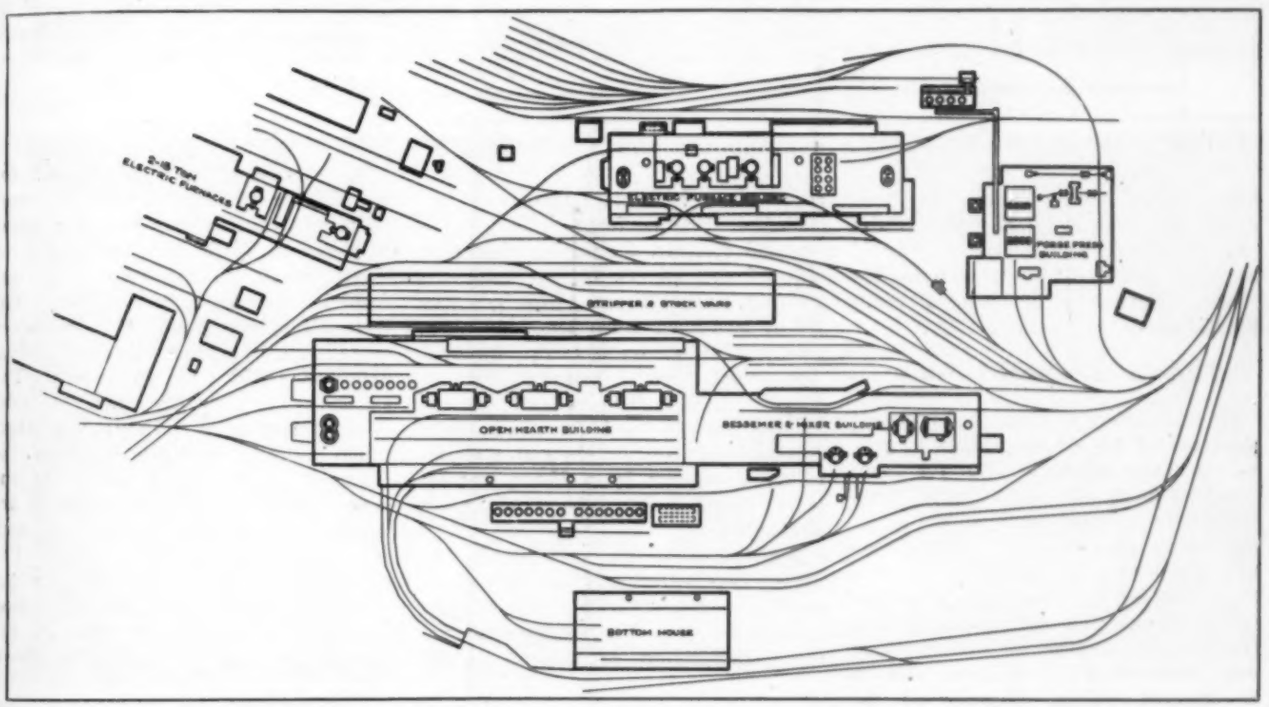


FIG. 2—GENERAL PLAN OF DUPLEX AND ELECTRIC FURNACE PLANT AT SOUTH WORKS

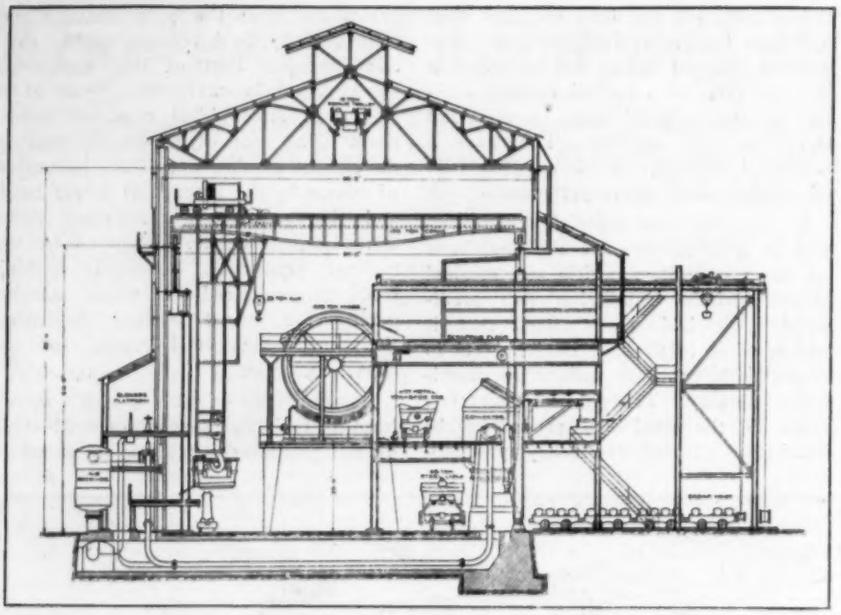


FIG. 3—SECTION OF BESSEMER CONVERTER AND MIXER BUILDING

tages of the duplex process for producing open-hearth steel. It likewise had been shown that electric steel could be most advantageously produced at South Chicago by the use of open-hearth metal.

Elasticity of Operation Sought

It was essential that the proposed plant should be so designed as to provide not only bessemer metal for open-hearth refining and open-hearth metal for electric refining, but bessemer ingots and open-hearth ingots as well. Many new problems were involved. It was clear that for the simultaneous production of bessemer, open-hearth and electric steel, extreme elasticity of operation was fundamental if efficiency was to be attained. Close assembly of the various units was essential for rapid and economical practice. The sequence of operation had to be unobstructed. A supply of hot pig metal and preliminarily refined molten steel must be provided. The plant as finally designed, both in respect to its general plant location and its general details of construction, is shown in Figs. 2, 3, 4, 12, 13 and 14.

Inasmuch as this paper deals specifically with electric steel, no attempt will be made to give a detailed description of the bessemer and open-hearth refining as carried out in the new plant at South Chicago. The metallurgy and physical manipulation present little that is novel, and the principles of the duplex process as such are well understood.

In respect to the plant, it will be noted that there are two main buildings: one comprising the duplex plant proper, and the other, parallel thereto, containing the electric furnaces. As an adjunct to the latter, there was installed a 1500-ton forge press. In its essential features, the duplex plant consists of two mixers, one of 1300 tons and one of 306 tons capacity; two 25-ton acid-lined converters, and three 250-ton tilting open-hearth furnaces. The mixers are commanded by two cranes, one of 100-tons and one of 75 tons capacity, and the mixer metal is transferred on an elevated platform to the converters by a 25-ton transfer ladle operated by cable and winch mechanism.

When used in the open-hearth furnaces, two heats of bessemer blown metal are poured into a 65-ton ladle commanded by a narrow-gage locomotive. Elimination of slag is accomplished by nozzle pouring into a second ladle. When bessemer ingots are to be produced, the metal from one vessel is poured into a smaller ladle and transferred to the bessemer pouring platform. The three tilting open-hearth furnaces, each of which has a hearth area of 892 square feet, are electrically operated, and are so constructed as to be heated either with producer gas or with tar. Air chambers having 10,472 cubic feet of checker volume and gas chambers having 6734 cubic feet of checker volume provide liberal regenerative capacity. Two low-type 7½-ton charging machines and three 100-ton overhead cranes assure the rapid handling of material. The pit side of the open hearth department, which is generous in its dimensions, is served by two 175-ton cranes, and is provided with a 330-foot pouring platform capable of handling two sets of molds.

Capacity is Large

The bessemer plant is designed for the ultimate addition of a third vessel. Its present capacity may be conservatively placed at 75,000 tons per month of blown metal, bessemer ingots, or any desired combination of the two. The three tilting open-hearth furnaces when operating on blown metal are rated at 65,000 to 75,000 tons per month. The elasticity of their operation is self-evident, and it is obvious that their actual tonnage is dependent upon the character of the charge used. At the present time two of these furnaces are running on open-hearth material, with bessemer blown metal as a base. The other furnace is operating on a nickel steel scrap charge with molten pig iron additions for further refining in the electric furnace in additional operations.

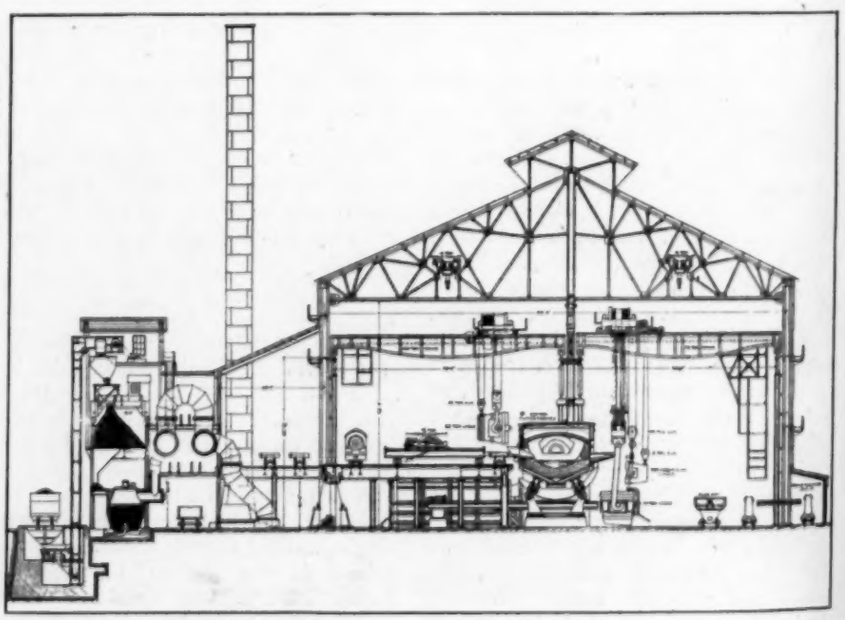


FIG. 4—SECTION OF OPEN-HEARTH BUILDING IN DUPLEXING PLANT

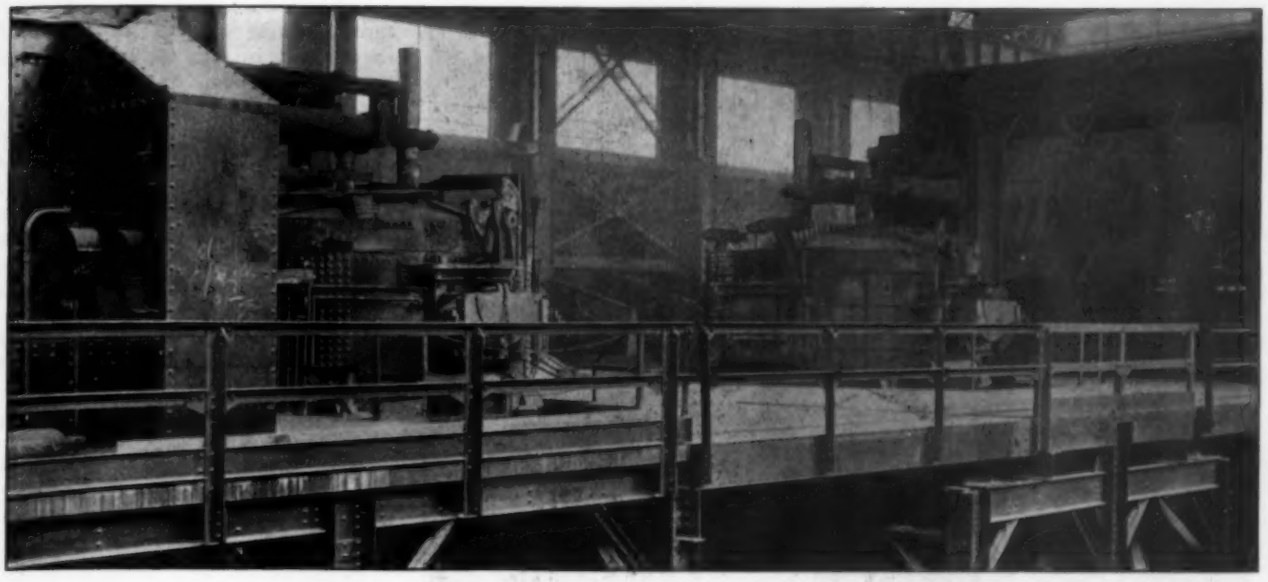


FIG. 5—TWENTY-FIVE TON ELECTRIC FURNACES IN ELECTRIC FURNACE PLANT

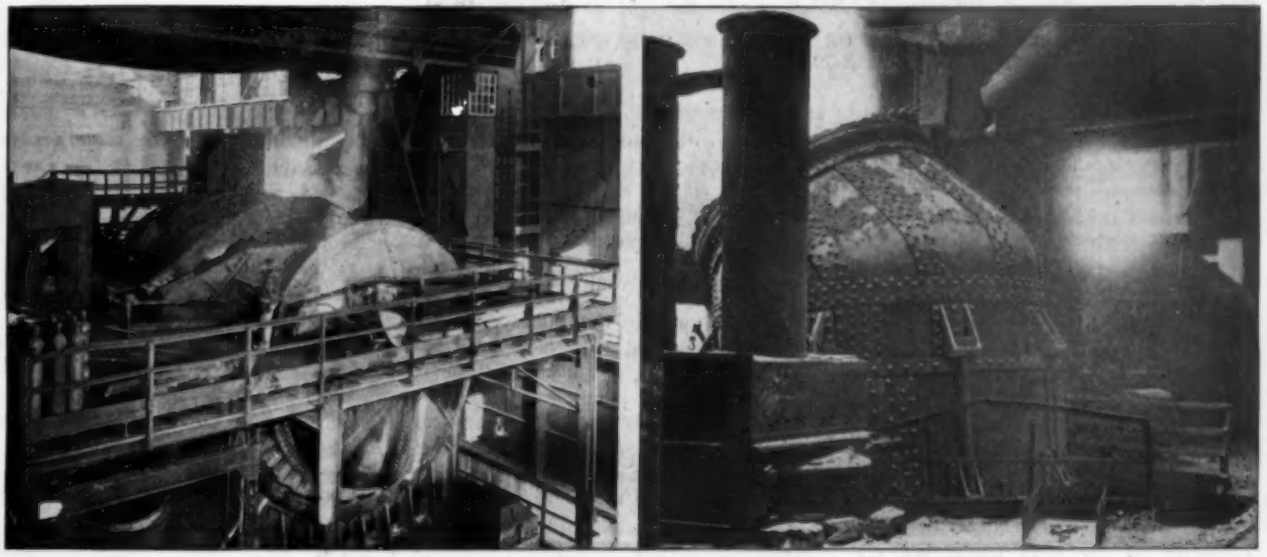


FIG. 6—POURING PIG IRON INTO 1300-TON MIXER. FIG. 7—BLOWING METAL IN BESSEMER CONVERTER

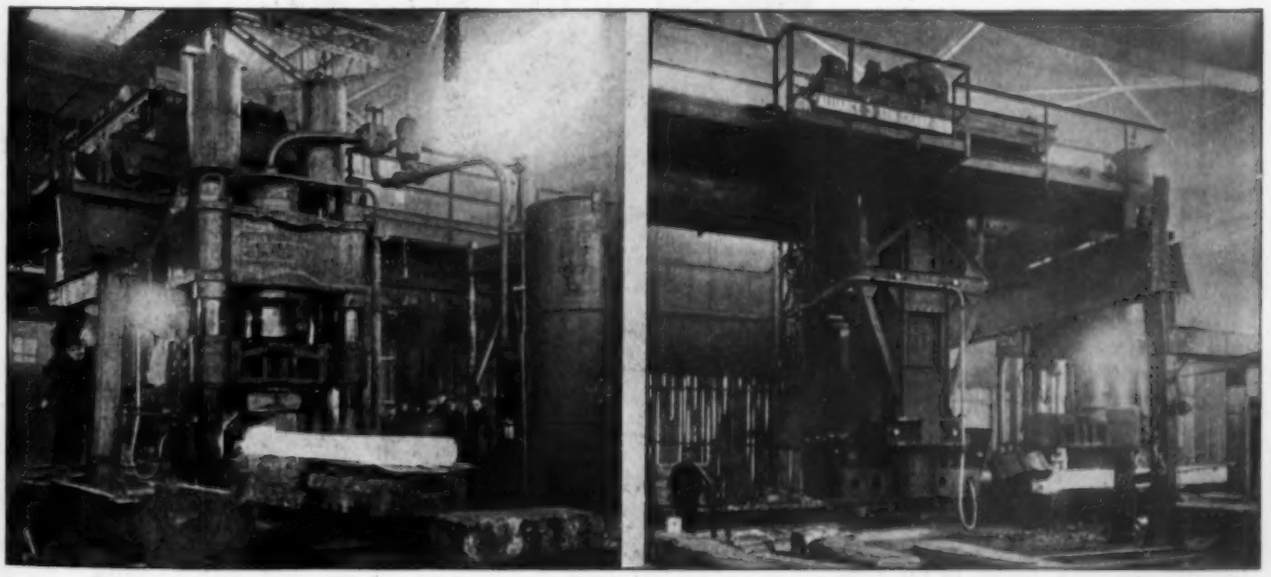


FIG. 8—FIFTEEN-HUNDRED TON HYDRAULIC FORGING PRESS FIG. 9—THREE-TON MANIPULATOR IN FORGE PLANT

FIG. 10—GENERAL ARRANGEMENT OF BESSEMER CONVERTERS IN THE DUPLEX PLANT

In transferring the open-hearth metal to the electric furnaces, it is the aim to have the metal slightly lower in carbon and manganese than the specifications under which the electric steel is to be made. There is of course often a wide range in the specifications under which the electric furnaces are operating, involving high and low carbon, and various alloy steels.

The new electric plant contains three 25-ton Heroult furnaces, each with an adjacent transformer building. The general design and dimensions are shown by the plan and cross sectional views. The capacity of the plant naturally is somewhat dependent upon the character of the steel made, but may be placed approximately at 12,000 tons per month. This with the output of the two old furnaces gives a total electric steel capacity of 16,000 to 17,000 tons per month, and makes the South Chicago works the world's largest electric steel producing plant.

The advancement in the design and operation of electric furnaces has not necessitated any radical change in the original electrical scheme as a whole. Such improvements as have been made have been rather in the nature of refinement than essential change. In the case of the large electric furnace, it is more necessary than in the small furnace to consider the losses due to reactance in the electrical current. When we consider the relatively little power required by the original furnaces, it is evident that in the case of our larger furnaces which are equipped with transformers of 3750 kilowatt-ampere capacity, the question of power losses is an important one. In respect to the electric furnace load from the central station standpoint, it is interesting to note that with four furnaces operating on the triplex process, 24-hour load factors of 75 or 80 per cent are not unusual. This compares favorably with other forms of industrial load.

A Reducing Slag Employed

In our practice, the furnaces ordinarily are operated with only a reducing slag, and care is taken at all times to see that such conditions obtain as will most thoroughly and quickly effect complete deoxidation. After the steel is thoroughly dead-melted and the reactions are complete as determined by the careful testing of the slag and metal, the current is reduced until a proper pouring temperature is obtained.

The pouring of steel from the electric furnace is subject at all times to the careful control of pyrometric observation. For the production of a satisfactory steel, a proper casting temperature is an important element in all processes, but with the electric furnace special care is needed, partially because of the high heats obtainable with the electric arc. Electric steel on account of its freedom from gases is specifically a dense steel, and in metal of this character the pipe tends to be exaggerated. It is our custom to teem all electric steel in inverted molds with refractory hot tops. As a result, little difficulty is encountered with the piping as usually found in the ordinary ingot.

In connection with alloy steels, it is very necessary to guard against any condition that will unduly tend to unequal ingot strains, and special precautions are taken to avoid undue surface tension in the molds. We are now casting ingots weighing from 3400 pounds to 38,000 pounds, the uniform solidification of which is made the subject of the greatest care. Top pouring, box pouring, and bottom pouring are resorted to, as the individual character of the steel best appears to warrant, and the entraining and inclusion of slag or other foreign matter is carefully guarded against.

To one familiar merely with the casting methods in vogue with ordinary open-hearth or bessemer steel, the pit practice incident to the proper manufacture of electric steel is something of a revelation. In the subsequent work to which the ingot is subjected, whether

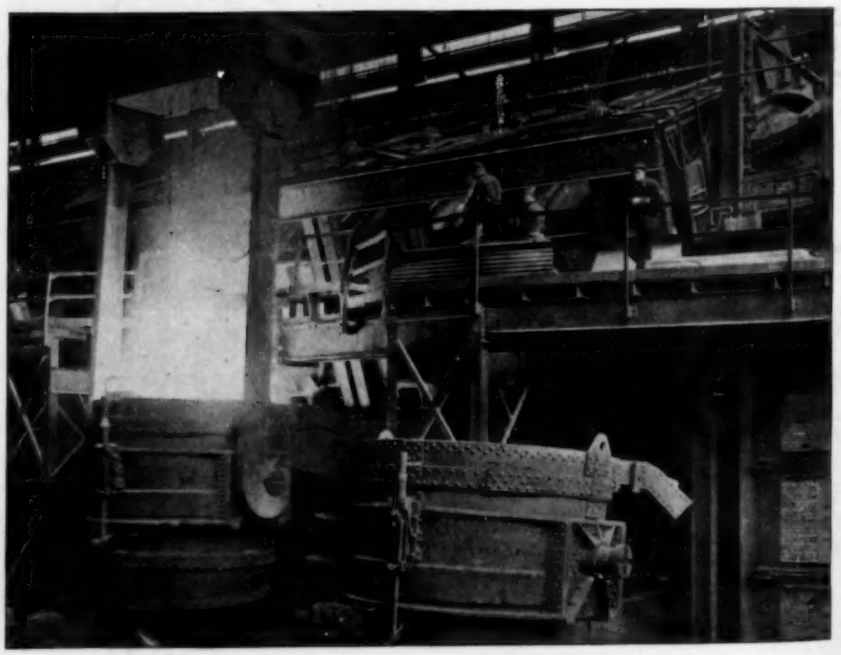


FIG. 11—TAPPING TILTING OPEN-HEARTH FURNACE IN DUPLEX PLANT

in the forge or in the rolling mill, special precautions are taken in the heating, in the reduction of the metal, and in the cooling of the product. Ordinary mill practice will by no means suffice if proper results are to be obtained, especially when alloy steels are concerned. Steel which may be innately of the highest quality when tapped in the ladle may readily retrograde or become unfit unless there is exercised extreme care in its later manipulation. Quality is peculiarly the *sine qua non* of electric steel, and the price of success is eternal vigilance.

There is of course nothing occult nor mysterious in the electric method, although there is more or less misconception concerning the production of electric steel. The electric furnace when used for the manufacture of steel may be likened to a large crucible heated from within instead of from without by the electric arc. It is capable of performing not only the functions of the open-hearth, but very largely those of the crucible as well. Its superiority lies in the rare purity of the heat derived from the electric current and in the peculiar slag control that can be commanded in a neutral atmosphere. Both the bessemer and the open-hearth processes are distinct in their physical and metallurgical character. The electric process may likewise be considered as distinct when concerned with the manufacture of steel directly from cold metal. When, however, it is used to finish metal which previously has been made in the bessemer or open-hearth, it may be considered as supplementary to standard methods rather than as an independent process. Other than as manufactured in the smaller and perhaps more ephemeral installations, electric steel is today, and probably will be in the future, largely produced by a duplex or triplex process whereby, strictly speaking, steel is electrically refined rather than electrically made.

Service the Ultimate Test

The manufacture of steel is far from being an exact science. It is an art founded upon scientific principles and to a degree subject to scientific control —but there is much in the metallurgy of steel that bespeaks ignorance instead of knowledge, uncertainty instead of definite determination. It logically follows that one should not be dogmatic in passing upon the respective qualities of steel made by different processes. As measured by customary chemical and physical standards, it is possible to show that steel made by the bessemer process is at times equal in quality to that made by the open-hearth, and steel made by the open-hearth is equivalent to that made in the crucible. By the same token, it may not be difficult to show that steel made by the open-hearth process is as good as that made in the electric furnace. Certainly some of our laboratory results, upon which we ordinarily depend for metallurgical guidance and control, warrant such an assertion. But just here science, paradoxically speaking, proves unscientific, and the laboratory oft-times does not square with the results in the field. We all know that irrespective of laboratory tests, the final verdict of result in service has already clearly established the superiority of open-hearth steel as compared with bessemer, and the superiority of crucible in its own particular field as compared with open hearth. In the last analysis, the characteristics of any metal must be determined by the composite testimony of practical experience.

And now a word as to the future: I am not unmindful that "A prophet is not without honor save in his own country." Moreover, human limitation and the kaleidoscopic changes of the past make one hesitate to forecast the metallurgy of steel. While ours is the age of steel, it has been given to men here present to see the passing of the age of iron. The crucible is hoary in its antiquity. The converter a short generation ago was but a conception in the mind of a man whom many of us knew personally, and the open-hearth as an essential factor is even more striking in its adolescence.

It behooves one, therefore, to be conservative in his prognostication. Forty years ago this country produced but little over 500,000 tons of steel, 90 per cent of which was made by the bessemer process. Last year we made 43,000,000 tons of steel, and to the open-hearth 75 per cent is to be accredited. While our production of bessemer steel has remained nearly stationary since 1906, when it reached its zenith with an output of 12,250,000 tons, the open-hearth has rapidly forged ahead, and last year it accomplished over 32,000,000 tons.

The marvelous development in bessemer steel was due both to its superiority for general purposes as compared with wrought iron and to its

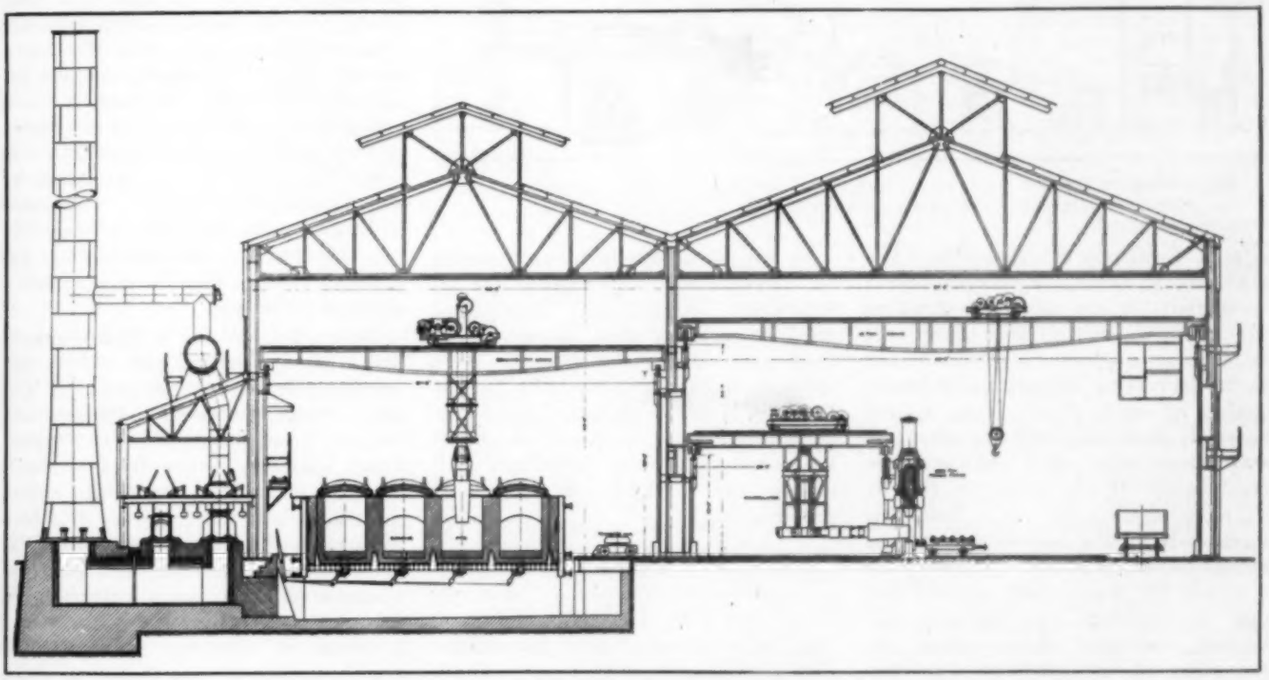


FIG. 12—SECTION OF FORGE PRESS PLANT SHOWING ARRANGEMENT OF SOAKING PITS AND FORGE PRESSES

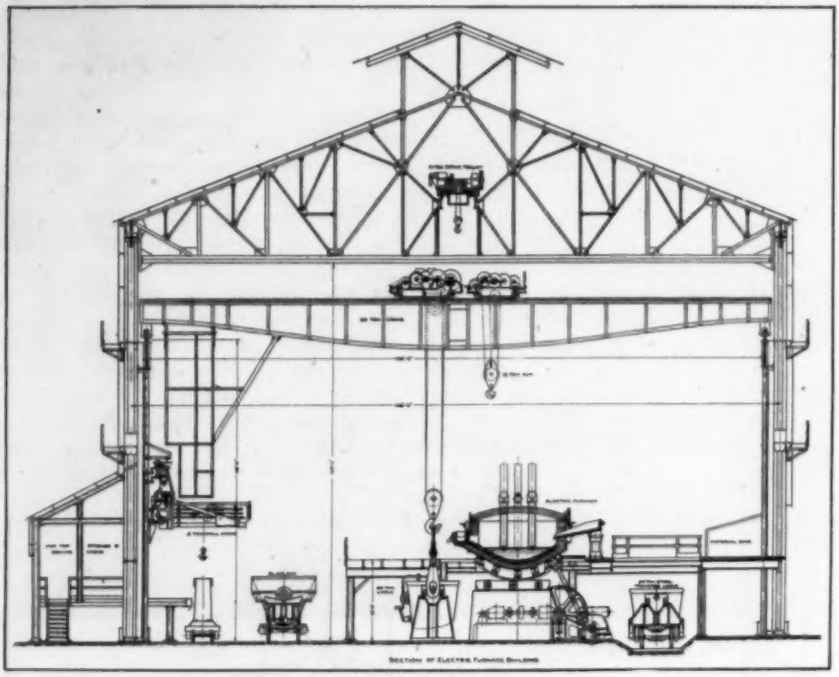


FIG. 13—SECTION OF ELECTRIC FURNACE BUILDING SHOWING ARRANGEMENT OF CRANES, TRACKS AND FURNACES

relative cheapness of production. The more recent expansion of open-hearth is attributable not alone to changing ore additions and to the lower cost incident to modern construction, but to the increasing demand for a higher quality of steel. The passing of the bessemer plate and the bessemer beam and channel was only a prelude to the replacement of the bessemer rail by its open-hearth rival. It is true that steel made by the bessemer process is admirably adapted to certain products, and for many years to come will play an important part in the metallurgical economies of our nation, but the glory of the converter has definitely paled before the more enduring reliability of the open-hearth. In the earlier stages of our steel manufacture, tonnage as an essential element of cost was a dominant consideration. Neither the mill nor the consumer attempted more than a general differentiation as to the character of the product. It was largely a matter of quantity and price. Now quality stands first, and while tonnage has gone on apace, volume has become more and more subordinate to character of production.

What does this increasing demand for higher quality portend for electric steel. How much is history to repeat itself in connection with the new process? It is clear that the lower the cost of production, the greater will be the field presented, and much will depend upon the ironmaster's ability to reduce the cost of electric refining to a minimum. When we realize the economies that have been commanded with the open-hearth furnace during the last 20 years, it perhaps is not unreasonable to anticipate that much may be accomplished along similar lines with the electric furnace. There appears to be no reason why electric furnaces larger than those already installed cannot be built. Cost should be inverse to tonnage, and high quality is not incompatible with large production.

A Striking Growth

If one is intelligently to read the future, he must take into consideration both statistics and psychology. The annual statistical report of the American Iron and Steel institute first separately classified electric steel in 1909, with a production of 13,762 tons. Last year this country produced 234,000 tons, which is more steel than was made annually in all our open-hearth furnaces 30 years ago. The output of electric steel this year undoubtedly will be much greater. We are now producing at the South Chicago plant at the rate of 140,000 tons per year, and we shall shortly be producing at the rate of 200,000 tons per year. Our country is growing rapidly, and the per capita consumption of steel is growing even more rapidly in comparison.

As for psychology, we should not forget that the luxury of today is the necessity of tomorrow, and that emulation is a powerful creative force. Bessemer steel was eminently satisfactory until the superior quality of open-hearth metal relegated it to a subordinate class. And now comes elecrtic steel with a still higher standard. Safety cannot be measured by price, and public opinion will more and more insistently call for the highest excellence in the automobile, the airplane, and other forms of fabricated material.

Forty year ago Sir William Siemens dreamed of making electricity the handmaiden of the metallurgical art, and through his efforts his dream was realized in the birth of electro metallurgy. Twenty years later, Heroult visualized the dominance of electro metallurgy in the realm of steel. Whatever the future may have in store, let us remember that progress waits upon vision, and vision even though it resolves for the moment into a mirage of shattered hope, often is finally translated into accomplishment.

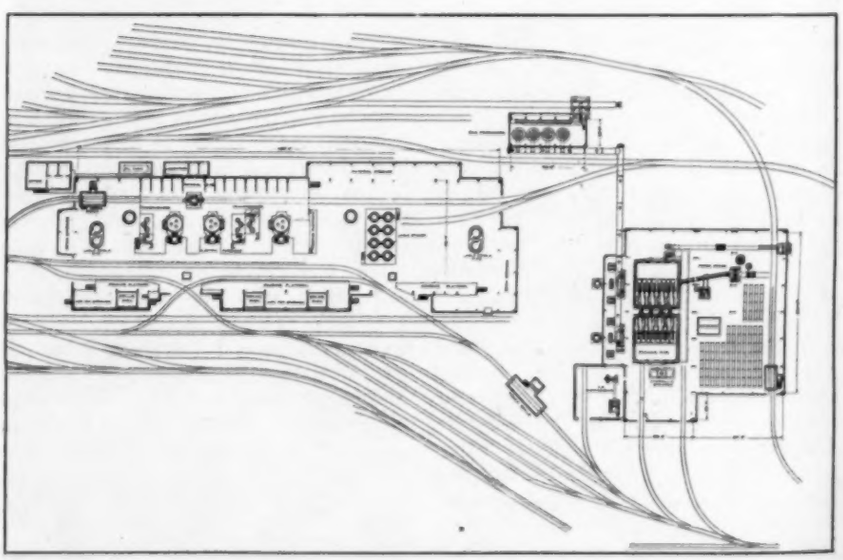


FIG. 14—GENERAL PLAN OF ELECTRIC FURNACE AND FORGE PRESS PLANTS AT SOUTH WORKS

Manganese Conservation Necessary

Curtailment of Importations by War Has Given Impetus to Domestic Mining —Limited Supply Calls for Rigid Economy Followed by the Elimination of Unnecessary Use of This Material

BY C. R. ELLICOTT

WAR'S effect on the manganese supply for the steel production of America has taught us that our greatest industry is dependent largely upon the importation of manganese ores or manganese alloys.

In the past two years, material efforts have been made to increase the domestic output of manganese ores and alloys spurred on, perhaps, by the high price per unit of manganese in the ores. The effect of this effort has been felt, but the situation is still serious. Now and in the immediate future it is not only desirable and profitable to prospect for, and develop manganese and manganiferous iron ores, but it is our patriotic duty from an economical standpoint to do all in our power to increase the domestic production of manganese alloys, and to conserve our available supply. Doubtless sufficient manganese ores and manganiferous material exist within our boundaries to meet our own requirements until normal conditions return. Meanwhile, it will be necessary for a broad-minded spirit looking toward the national welfare to exist, first among the steel manufacturers, and second, between the manufacturers and the steel consumers.

The Effect of Manganese

The influence of manganese must be appreciated to its fullest extent in steel manufacturing, and equally important, its effects upon the finished product must not be overrated if any economical departure from our present standards is to be made. Manganese is used in steelmaking for three distinct purposes: First, in the melting operation it is of great advantage up to a certain percentage of the charge, as a deoxidizing agent for making ingots which can readily be rolled or forged with the minimum amount of scrap and defective material; second, it is used in specified percentages to give desired physical results in the finished product, acting as an alloy; and third, it is added to obtain a specified percentage in the finished material, but not for the hot working qualities of the steel nor for desired physical properties which would necessarily be a function of manganese. It is added as a matter of accepted practice subscribed to by both producer and consumer without considering manganese conservation.

These three purposes are considered in detail as follows:

As a Deoxidizing Agent:

In the average open-hearth practice 0.60 to 0.80 manganese is in the charge from the pig iron and scrap. All furnace reactions including decarbonizing, dephosphorizing and desiliconizing are oxidation processes. Some oxides are soluble in molten steel, and these, when the steel is near the point of solidification, will usually generate gas, thereby forming blowholes, which appear as surface or internal defects in the finished product. In addition, oxides contribute to what is commonly known as "red shortness" or brittleness when hot. Manganese material in any form in the initial charge prevents the formation of soluble oxides in the steel, or reduces what might be formed during the period the steel is molten. In other words, if an appreciable percentage of residual manganese can be maintained in the open-hearth furnace from the time the charge is melted, until it is tapped, further additions of manganese can be eliminated in high carbon steels, and greatly reduced in lower carbon steels to produce the same ductility in rolling which would be expected from heats which were low in residual manganese and finished with high manganese recarburizing additions.

This practice will not reduce the total pounds of manganese added to a given ton of steel, but it will permit the use of a lower grade of manganiferous material available in this country to replace the higher grade material which in normal times has been imported.

Physical Properties:

The second use of manganese is to give special physical properties to the finished product, subdivided as follows:

(a) Steel used in the rolled, forged, cast or annealed conditions.
(b) Steels heat-treated.
(c) Special manganese steel containing 11 to 14 per cent manganese.

Subdivision (a) contains by far the greatest tonnage of steel produced. The effect of manganese on the physical properties of these steels is to increase the elastic limit and tensile strength. In cases where this is the sole purpose of manganese additions, we suggest the use of other strengthening elements, preferably carbon.

Subdivision (b) consists of heat-treated steels of normal manganese content. The effect of manganese is similar to nickel, except that its influence is not so marked. Its effect is to retard the transformation of austenite in cooling. The use of manganese for improving the physical properties of heat-treated steels is not essential, as this improvement can be obtained by other available elements. We would, therefore, suggest that where nickel can be substituted, the use of manganese be restricted, and in other cases, where it plays no part in heat-treated results, it be reduced to a point where its function is of forging or rolling importance alone.

Subdivision (c) Hadfields manganese steel containing 11 to 14 per cent manganese is a special product with special physical properties due to the manganese content. No change in present practice for this steel can be made.

Specifications:

The other function of manganese is to fill specifications. There is no question but that many consumers specify a manganese content for no reason within their knowledge and for no special purpose. A large tonnage of the steel produced is made to both physical and chemical specifications. If only the physical qualities in forged, rolled, cast or heat-treated products were specified, the manufacturer would be free to economize in manganese.

Manganese Requirements for Steel

The statistical record of steel production for 1917 has been delayed, but since the total 1917 production was close to that of 1916, the 1916 figures are used as a basis. We have classed the various grades of steel roughly according to manganese content usually specified. These classes are arranged in the order of their tonnage importance.

Class 1.—Low carbon steels below 0.25 carbon, such as structural steel shapes and plates for bridges, buildings, etc., boiler and fire box steel, plates, shapes and bars for railway cars; low carbon splice bars, forging steels, rivets, pipe, tubes, tin plate, bolts, sheets, spikes, tie plates, wire rods, merchant bars, etc.

Class 2.—Medium carbon steels 0.25 to 0.80 and high manganese steels, including bessemer and open-hearth carbon steel rails, quenched high car-

This paper by C. R. Ellicott, superintendent of furnaces and mills at the Lehigh plant of the Bethlehem Steel Co., South Bethlehem, Pa., was presented at the fourteenth general meeting of the American Iron and Steel institute, held at New York City, May 31.

bon splice bars, nickel, structural, rivet, silicomanganese spring steel, chromevanadium automobile and railway spring steels, machinery, ship and structural forgings, alloy, machinery and commercial forgings, heat-treated axles and shafts, steel wheels and tires, carbon shell steel, rifle barrels, small arm parts and low-carbon open-hearth and bessemer cold-drawn screw stock.

Class 3.—High tensile carbon and alloy steels containing 0.60 to 0.70 manganese. In this class is included gun forgings and castings, marine and heavy machinery forgings and castings, structural ship steels, automobile bar stock, forgings, etc.

Class 4.—High carbon low manganese steels, high carbon and other steels, involving comparatively small tonnage. This would include file steel, armor plate, armor piercing shells, carbon and alloy tool steels, carbon spring steel, nickel chrome commercial bar stock, punches and dies, etc.

The tonnage of ingots of these classes for the year 1916 was approximately as follows:

Class	Tons	Percent of Production
1	21,350,000	49.89
2	11,998,187	28.06
3	9,008,186	21.07
4	417,307	0.98

The steels of Class 1 are considered as low tensile, or soft steel, having as a rule an ultimate strength below 70,000 pounds per square inch. The method of manufacture for the same grades varies between manufacturers. Some prefer to make what is known as "dead" steel, which contains on an average 0.60 per cent manganese; others "churned" or "rimmed" steel, analyzing on an average 0.35 per cent manganese. We will assume that the average of all steels in class 1 is 0.50 per cent manganese. The residual manganese in the steel bath in the furnace would be less than 0.10 per cent, so that with 30 per cent less of manganese added, this steel would require an addition of 0.60 per cent of metallic manganese, or a total of 128,100 tons.

In Class 2 the manganese varies from 0.40 per cent to 1.40 per cent manganese, the average being about 0.70 per cent. The method of adding manganese to these steels varies considerably, depending upon plant construction, and the individual opinions of the operators. At present there are five methods in common use for adding manganese as follows:

(a) Adding cold crushed ferromanganese in the ladle or furnace.

(b) Melting ferromanganese in electric or oil furnace, or in special cupolas, and adding molten in the ladle.

(c) Melting spiegel in a cupola and adding direct or diluted into the ladle.

(d) Adding about 5 per cent manganiferous pig iron from mixer or cupola to furnace or ladle.

(e) Recarburizing with 1.00 to 2.00 per cent manganese iron in the furnace or ladle and adding the balance of the manganese in alloy form.

In this class of steels probably the greatest proportional conservation of manganese could be accomplished. Assuming a residual manganese of 0.10 per cent before tapping, and a normal manganese loss of 20 per cent, this class would require an addition of 0.75 per cent manganese, or a total of 89,986 tons of manganese.

In Class 3 a considerable percentage of the product today is forgings for guns and ships and castings made from both acid and basic steels. These steels we will consider as high-grade products, low in sulphur and phosphorus. It is a common practice to add in the nighborhood of 0.20 to 0.30 per cent manganese to the charge in the form of ferromanganese or low phosphorus spiegel in order to increase the manganese content of the charge to about 1.00 per cent. These steels will average 0.65 per cent manganese in the finished product, and will have a normal manganese loss of 20 per cent. With a residual manganese of 0.15 per cent before tapping the final additions would be 0.63 per per cent. With 0.20 per cent manganese charged, the total tonnage requirements of manganese would be 74,767 or 18,016 tons in charge and 56,751 tons in final additions.

In Class 4 the manganese additions are small, for (to use a mill term) the heats are "caught coming down" as carburization is started when the desired percentage of carbon is reached, and the manganese, as a rule, is within specifications. We will say that this grade requires an addition of 0.10 per cent on an average, or 417 tons of manganese.

The total manganese requirements from 1916 figures are therefore:

	Tons Manganese
Class 1	128,100
Class 2	89,986
Class 3	74,767
Class 4	417

or the equivalent of 366,600 tons of 80 per cent ferromanganese.

The manganese alloy production and imports of the United States for 1917 were:

	Tons
Ferromanganese produced	286,000
Ferromanganese imported	45,381
Spiegel produced	193,291
Total contained manganese produced and imported	304,000
Manganese ore imported	629,971
Ferromanganese from imported ores	300,000
Contained manganese in alloy produced from imported ores	240,000

The domestic production of high grade manganese ore for 1917, is estimated by the United States Geological Survey at 122,275 tons, and this is expected to reach 172,900 tons in 1918. Using the 1918 figure, this will net us but 70,000 tons of 80 per cent ferromanganese or 56,000 tons of contained manganese. The low grade ores are being produced at an estimated rate of 800,000 tons for 1918. This will yield about 340,000 tons of an alloy containing an average of 35 per cent manganese, or 119,000 tons of contained manganese.

The situation is, therefore, briefly this: We require, at our present rate of steel production, present specifications and methods, 293,270 tons of contained manganese per year, and we are producing in 1918 at the rate of 175,000 tons from our own raw materials.

There is no question that the importation of manganese ores or ferroalloys is undesirable at the present time. We have the manganese in our country in sufficient quantity to be independent for some years. We can produce it and certainly can devise means to make it applicable to our steel production in the immediate future. We have been accustomed to the use of 80 per cent ferromanganese in the manufacture of open-hearth and soft bessemer steels, but we can substitute lower percentage manganese alloys for this work, which can be produced in our own country, particularly if the steel specifications have their manganese limits reduced.

The majority of the steels in Class 1 could be "churned" or "rimmed" steel with 0.20 to 0.40 per cent manganese, and be of as good quality and, at the same time, eliminate the use of high grade ferromanganese. In Class 2 recarburizing could be done with 5 to 6 per cent manganiferous iron, or spiegel and iron below 0.15 per cent phosphorus mixed in the proper proportions and added molten. In Class 3 the highest grade ferromanganese could be used for probably half of the product. With comparatively low carbon and high manganese, the low grade manganese alloys would not be suitable because of the proportion of manganese to carbon. In acid steels of low phosphorus, the use of the lower grade alloys would be prohibitive due to the impossibility of producing a low phosphorus low manganese alloy. In Class 4 spiegel or alloys containing less than 20 per cent manganese could be used entirely.

By using pig iron containing 2.00 to 2.50 per cent manganese in open-hearth charges, the residual manganese

in the steel before tapping will vary between 0.20 and 0.40 per cent, so that in many cases further additions of manganese for deoxidizing purposes are not required, and the final manganese additions are for physical properties only. With basic steel at 0.40 per cent, 10 points of manganese would add 2,500 pounds per square inch to the tensile strength. The same effect could be accomplished with three to four points of carbon. As an example, all the standard specifications for open-hearth rails today, call for manganese limits from 0.60 to 0.90 per cent. No reason exists why this specification should not be changed, to read, manganese 0.40 to 0.70 per cent, with a higher carbon adjustment to give the same physical qualities. It would appear therefore, that at least an average of 15 points of manganese could be reduced in the specifications for steels in Class 2.

Without the use of high manganese pig iron in the charge, assuming our previous conclusions are possible, the requirements of ferromanganese and spiegel and lower manganese alloys are shown in the accompanying table. This leaves about 700,000 tons which will produce 520,000 tons of alloy averaging 20 per cent manganese. This would leave a shortage of 150,140 tons of spiegel.

In the last 12 years the spiegel production has varied from 83,000 to 348,000 tons per year. What proportion of the ore available for the manufacture of 35 per cent manganese has been used heretofore for spiegel manufacture is impossible to estimate without a detailed canvass of the various producers. The fact remains, however, that there are great quantities of low grade manganiferous iron ores in this country. The use of 1.50 to 2.50 per cent manganese pig iron in the open-hearth charge would reduce the quantity of manganese required for additions, approximately 15 per cent for basic open-hearth steels, or a further reduction of 10.6 per cent manganese in the total steel produced.

There is ample reserve of ores to produce sufficient 5.00 to 6.00 per cent manganese recarburizing iron for a considerable period. The annual requirements of this grade would be approximately 900,000 tons, which

Tonnage Requirements

Class		Metallic manganese required	Ferromanganese, per cent 80	60	40	20	6
		Tons	Tons	Tons	Tons	Tons	Tons
1		100,345	0	25,085	40,138	346,200	0
2		71,990	0	0	0	179,975	598,715
3—Charge	18,016	.....	35,470	0	0	141,880	300,300
Final	56,751	74,767					
4		417	0	0	0	2,085	0
Totals		247,519	35,470	25,085	40,138	670,140	899,015

By changing or standardizing our method of recarburizing adopting a standard process for the manufacture of soft steels, and lowering our specified manganese requirements where possible, we can reduce the total tonnage of manganese from 293,270 tons to 247,519 tons or 15.6 per cent. Further, the requirements of 80 per cent low phosporus ferromanganese is reduced to 35,470 tons.

The estimated production of 80 per cent ferromanganese from domestic ores will net us 70,000 tons for 1918, which is sufficient for the country's needs. The manufacture of 60 per cent ferromanganese will require high grade ores so that 25,085 tons of 60 per cent ferromanganese will lower the possible production of 80 per cent from 70,000 tons to about 51,200 tons and 40,135 tons of 40 per cent ferromanganese should be made from the lower grade ores. This will require approximately 100,000 tons of ore. could probably be increased to produce a further saving of 20 per cent spiegel.

It has been customary for us to specify a phosphorus content in ferromanganese of not over 0.250 per cent. This is probably not so vital as we have always considered it. For example, an addition of 0.60 per cent manganese using 80 per cent ferromanganese of 0.25 per cent phosphorus, would cause a phosphorus addition to the steel of less than 0.002 per cent. In most cases this limit of 25 per cent could be appreciably increased without affecting the quality of the product. The addition of 0.50 per cent manganese through the use of spiegel would add to the steel 12 points of carbon, and assuming we could afford to 0.015 points of phosphorus, the spiegel could contain 0.600 per cent phosphorus, which is well above the content which spiegel produced from our own ores, would contain. For basic steels this would be no hardship; for sheets and tin plate it would be an advantage, but for high grade acid steel, the 80 per cent ferromanganese would necessarily be used on account of the phosphorus.

The phosphorus content of our high grade domestic ores 40 per cent and above is roughly estimated in the following table. The estimated production for 1918 is from the United States Geological Survey.

High Grade Manganese Ores, 40 Per Cent and Above:

State	1918 Production Tons	Probable Phosphorus Content Per Cent
Alabama	200	0.200
Arizona	22,000	0.050
Arkansas	10,000	0.200
California	12,000	0.100
Colorado	500	0.200
Georgia	5,000	0.100
Montana	81,600	0.050
Nevada	2,500	0.100
New Mexico	1,500	0.100
North Carolina	100	0.150
South Carolina	2,000	0.150
Tennessee	5,000	0.150
Texas	2,000	0.050
Utah	4,000	0.150
Virginia	20,000	0.200
Washington	1,000	0.100
Wyoming	500	0.100
Total	169,900	

Low Grade Ores for Manufacture of 35 Per Cent Ferromanganese:

Appalachian Region	40,000	0.200
Arizona	25,000	0.100
Colorado	100,000	0.200
Lake Superior	150,000	0.200
Lake Superior	150,000	0.090
Montana	25,000	0.080
New Mexico	36,000	0.100
Zinc Residuum	175,000	0.040
Miscellaneous	15,000	0.200
Total	716,000	

A serious difficulty which becomes apparent from the above tabulation is the selection of furnaces for the manufacture of the various alloys, the economic transportation of raw materials and the distribution of the product to the best advantage.

With our present methods of recarburizing, if imports were suddenly cut off, we would find our production of steel greatly impaired. Our country is actually short less than 160,000 tons of 20 per cent spiegel or 11 per cent of our manganese requirements, if we use to the best advantage possible the ores that we are producing at our present rate, but with our present methods we are short approximately 40 per cent. The ores are available for spiegel production, but they must be mined and converted.

It cannot continue to be a question of costs, nor can the usual routine of specifying and buying ferromanganese remain. This situation demands the guidance of a strong, able, impartial committee of the American Iron and Steel institute, which knows, and can tell, or show how our materials are to be used.

With such a body of men and the hearty co-operation of every steel plant in the country, we can make our greatest manufacturing industry as independent as it is great.

Steel Industry Meets the Mark

Call of Country Has Been Answered in Patriotic, Aggressive and Fair-Minded Spirit Says Gary—Criticism at Washington Gives Way to Active Co-operation—Time to Fight With All Power

IT IS a pleasure to greet so many members of the iron and steel industry at this meeting, nearly eight years after the first meeting was held. Those who were present will remember that the first meeting was held in a rather small room adjacent to this one, and that room was not filled. It gave promise of great results, and our expectations, have been more than fulfilled.

There are incidents connected with that first meeting which now seem to us rather sad. There were representatives from the iron and steel industry of all the steel-producing countries. There were men from Germany and Austria, men of high type, fine character, men who were a credit to civilization, men for whom we had very great respect, and men who, if in the control of the affairs of their affairs of their respective countries, would prevent the continuance of present conditions.

Following that meeting, in 1911, at Brussels, another international meeting was held, attended by many who are present here today, and by quite a large number of representatives of the iron and steel industry of the various steel-producing countries of the world. It was a most harmonious meeting and promised great results. They have not been fulfilled. But I may say, again, that if the men who were at that meeting were in control of international affairs in my judgment, there would be no wars.

War Conditions Desperate

The war conditions in Europe are not only deplorable, but today they are desperate. We hardly know what to think, and we are not inclined to consider what may be the possibilities. We have for some time realized and we see now more clearly than ever before that the commencement of the war was deliberate and was influenced by a desire on the part of a few individuals, comparatively speaking, to rule the world by might.

We may carry our minds back to the conditions of Europe and Asia and consider for a moment the desperate, despotic, arbitrary and cruel methods of conquest and lust, and we can think of nothing worse than the things which are being done today.

It would be impossible for anyone, much less myself, to attempt to picture the misery, the agony, the suffering of mind and body, that is going on in France today. The conquering hosts are cruel to the limit in their methods and in their treatment; and even though we hope to be happily disappointed we must not expect, gentlemen, that in the near future there will be any great successes on the part of the valiant hosts who are fighting in defense of humanity.

In all history there has never been any picture of battle scenes and battle results which were so terrible as those now existing and which we fear may be continued for some time.

It would be useless to discuss what ought to have been done to prevent these conditions. We are not at this time particularly concerned with the past. Many of us, probably most of us, perhaps all of us who are present on this occasion, would have done things some years ago that were not done. Some of us at our regular steel meeting in October, 1914, as forcibly as we could, presented our views as to what should be done. But that is a thing of the past. There were reasons for nonaction. Whether they were good or valid we need not talk about it at the present.

It would not be useful now to refer in the tone which I have adopted, to the awful things that from our viewpoint are being done in Europe, except for the purpose of emphasizing in the strongest words and in the best possible manner, the fact that we personally are not without courage, we are not without vision, we are not without appreciation of our responsibilities. The people of this country, represented by such as you, will never give up this fight until (what we believe is not possible) Germany comes to this country and actually conquers and subdues the people who are here.

I was pleased to hear Mr. Schwab say night before last that of all the different lines of industry the steel and iron people are doing better, more loyally and more effectively their duty than any others. And, gentlemen, we may have to do much more than we have done; we may have to devote more time and expend more money in assisting to carry on this war. Taxes are liable to be much higher than they have been. There is talk of doubling the income tax and the excess profits tax and of taxing many other lines of industry or activity. And we may expect very much greater hardships.

Measure Up to Mark

The individual who possesses little or nothing to be taxed, who represents little or nothing which can be taxed, is often quite prompt in saying it is immaterial to him how large the taxes are and he is surprised that people generally seem to be so indifferent and so selfish; but the men who are here this morning have and represent a great deal, and in dollars and cents we know that this war will be more costly to us as it proceeds. We know that our property, for most of us have some property, and the large interests which we represent, will be more and more heavily taxed. But in defense of the rights, the liberties of the men of this country, in defense of civilization itself, we do not care what the

The Will to Fight

WE have reason to be hopeful. The man who recognizes the dangers and the difficulties which are in sight is not necessarily a pessimist. I prefer the man who takes a broad vision, which covers disasters and possibilities of destruction, but puts his back up against the wall, and with his teeth shut, proposes to fight it out until success is achieved. I do not care for the man who is so optimistic that he never sees anything but sunshine and prosperity and happiness, for he never accomplishes anything worth while. Gentlemen, this is a time for judgment, for patience, for level heads, for patriotism, and above everything else the grit that stands and fights and never gives up. For the long future I am an optimist. I believe we will win this war. Why will we win it? Because first of all we are right. We know our rights and we seek our rights and we have the brains and the ability and the courage to stand for them until they are secured.

Opening address by President E. H. Gary before American Iron and Steel institute at New York, May 31.

expense is or will be, provided it is equitably distributed, and provided, to the best of the ability of honest and faithful men, the money is well expended.

Steel men have marched up to the point of obligation at every opportunity with the most patriotic, the most loyal, the fairest disposition, having in mind the one idea of trying to serve the country faithfully, in total disregard of personal gain or success. Whatever may happen in the future to us, to our business, or to our country, we shall have the satisfaction of knowing that we did our best, and we did it patriotically, with pure motives and with a desire to render service that our friends and our children may always know was well rendered.

Washington Seeks Co-Operation

Now, this disposition and action on the part of the steel people has had its effect in Washington. There have been times when our whole business was by some criticized unfavorably. Even since the war, your general committee has met officials in Washington, who at first seemed disinclined to render fair judgment or to grant what, under all the circumstances, we believed we were entitled to.

You have read in newspapers that it was disposition and the intention of the governmental officials to take possession of the iron and steel industry and manage it, and you have read that it was proposed to do or not to do a good many things which seemed to you unfair. I cannot speak for the future. I do not know what may happen. I do know that it frequently turns out that there are government officials as well as others, who prove to be incompetent to fill the positions which they occupy; and there is always danger of a mistake being made, and, of course, we may have reason for apprehension; but we can speak of the present and the past—that we know, and I believe my associates on the committee will confirm what I say—that after we have met the officials in Washington and have had full opportunity to discuss with them the questions raised or the action proposed, the final result has been, though not entirely satisfactory to us, yet in the main proper, all things considered.

There have been times when we have been more or less discouraged. Claims have been put forth that were not justified by the facts and the figures, and at times it has seemed to us temporarily there was great danger of our lines of business being injured and perhaps jeopardized, but by patience and perserverance and discussion we have been able to avert disaster, at least, and have generally secured what was appropriate, certainly from the standpoint of the government officials.

Today you will hear very little of anything in Washington against the iron and steel industry. You have demonstrated that the professions which you have been making during the last 10 or 11 years were sincere. You said in your speeches at your meetings time after time that you had no improper intention relating to your management, that you were not disposed to do anything which would be injurious to the public interests, that it was a cardinal doctrine of the iron and steel men that they hoped to be of real benefit to the public, and that their management so far as it could be controlled by those in authority, would finally be proven to be above reproach; and I believe all Washington is of that opinion at the present time.

We find today government officials in high places coming to the steel men with the statement that they want to co-operate with us, that they want our assistance; that they depend upon our loyalty and our ability to assist the government in this time of great distress. It is to my mind a source of gratification that we may look forward to the future with hope and expectation that the government of the United States is going to assist, to foster prosperity and business enterprise, instead of attacking it.

We must remember always that we cannot expect to get more than our just deserts, and we must be loyal to the government and loyal to the law of the land, and we must be reasonable and just, and expect that when we deserve punishment or censure we will get it from the government. Carrying our minds back to the dark business days of 1907 and some that followed, and to the words spoken by many of the gentlemen now here concerning their intentions—we know all meant what they said; you have proven this. We know that in the future your acts will correspond with your heretofore expressed intentions and therefore that we may not only hope but we may expect there will be co-operation between the government and the business people, and that consequently this country, if we succeed in this war, will have reason to occupy the highest and best position of all the nations of the earth.

Putting Affairs In Shape

We are doing another thing, gentlemen; and the government is permitting us, assisting us, urging us to do it. We are day by day putting our affairs in better shape . We may not be making so much money, or if we do make it we may be paying it out in taxes and in extensions to our works for the benefit of the government at such cost that we are absorbing our profits, but nevertheless we are putting our works in better condition; we are being better prepared for the future, the iron and steel industry will be on a better basis and a better footing than ever before; well prepared to succeed in the contest and the competition for international trade. If we win the war that will be worth something to us, if we do not have much in cash. If we lose the war then it is not so important whether we have anything or not.

On the whole, gentlemen, our business is good. We at least have a steady customer, and one able to pay. Our prospects at the present time, notwithstanding the horrors and the costs of the war, are good.

After the war is over, when history is written up, the fair minded man who writes the account will say that in the ranks of the hosts of really fighting men, with fighting disposition, were the members of the iron and steel industry of America.

The Spirit of Sacrifice

I REMEMBER in 1914, on the third and fourth and fifth days of August, I took pains to go around the street of Paris to see the mobilization of troops. I saw French soldiers by the thousands marching along the streets going to the stations to take trains for the front; and along with these boys and men were their wives and their sisters and their old fathers and their children, allowed by the gendarme to proceed without interruption, and, while everyone knew that every soldier so soon as he got to the front would probably be in the midst of battle, and that many, many of them would lose their lives, there was not a tear or a sigh to be seen or heard. Every woman, every child, every old man was encouraging the boys as they marched along the streets. And such is the spirit of this country. Why is it so? Because we know as they knew that we have the right on our side, and that the other side has nothing but might.

Acclaim Grim Resolve of Victory

Iron and Steel Institute in Largest Meeting of History Gives Demonstration of Determined Patriotism—Schwab Inspires Producers to Utmost Efforts—Replogle Praises Co-operation of Industry But Sounds Shortage Danger

A SHADOW cast upon it by the German drive to the Marne served only to intensify the sober determination and the will to make the iron and steel industry a great instrument of victory at arms, which were displayed on every side at the fourteenth general meeting of the American Iron and Steel institute at New York May 31.

The iron and steel producers gathered in such numbers as to far outrank the meetings of previous years, heard their leaders and government representatives declare the industry had fully measured up to every call of the country and government upon their patriotism and power. They responded with their enthusiasm and cheers to the declarations of Judge Gary that whatever more was demanded of the industry both in tonnage and treasure would be cheerfully forthcoming. The slogan "Everything for war and victory" was everywhere and supreme. Private business considerations were wholly set aside.

The meeting had its memorable moments. Charles M. Schwab, director of shipbuilding, received a wonderful ovation when he rose to speak at the evening's banquet. He fired his fellow manufacturers with a resolve to do their utmost to co-operate with him in his great task. His address was sober, yet inspiring, and was colored by characteristic optimism. J. L. Replogle, steel director, also was accorded an enthusiastic greeting. He praised the 100 per cent service which the iron and steel industry was rendering the government but emphasized the great demands of the war which would take up, he said, the whole output of the works for the balance of the year at least. He placed the present bookings for the government and its allies at 16,800,000 tons.

The formal program of the meeting was featured by various papers of exceptional excellence and significance. The first description to be publicly presented of the triplex process of steelmaking as perfected by the Illinois Steel Co., attracted much interest and was looked upon as a far-reaching development. Motion pictures were used to clearly display the various steps of the process from the blast furnace, through the converter, open-hearth and electric furnace, to the forging press or rolls. Conservation of ferromanganese was another timely and important subject given extensive treatment. The registration of the meeting was record-breaking, totalling between 1100 and 1200.

"I FACE you with a heart so filled with responsibility and a heart so filled with the thought that my friends in the iron and steel industry have placed on me a trust which I cannot fail. I must speak as the heart dictates in a tone of deep responsibility of the situation in which the United States and all its people find themselves tonight," said Mr. Schwab. In reminiscent vein he carried the banqueters back to the formation of the institute in a small way more than a decade ago. He paid a tribute to Judge Gary, "as a true friend to myself and every single man in the American Iron and Steel institute." He congratulated the iron and steel industry in having at Washington as a director of the iron and steel business a man of the caliber of Mr. Replogle.

Mr. Schwab expressed his appreciation of the enthusiastic reception given him by his fellow iron and steel makers and said that such encouragement and good will would be a tremendous help in his undertaking. He said he was not so vain as to think that he individually could be responsible for the success of the great enterprise. The united effort of everyone is needed. "No man or group of men can be successful in this undertaking without the approval and encouragement of every man, woman and child in the United States," he said. He spoke of the natural tendency to criticize things in Washington. "I am sure I would not be fair to myself or to my associates if I did not say that the work of Messrs. Hurley, Piez and others has been magnificent. I have examined 65 to 70 per cent of the ship-producing capacity of the United States, and I must say that the work has been magnificently accomplished. I do not believe that we in Washington cut a figure in this great undertaking after all. The men in direct charge of the shipyards and accessory plants are those who had the real responsibility. This responsibility rests not only upon the managers, but on the superintendents, foremen, subforemen, yes, on the workmen themselves. We have started on a ship program with a wave of enthusiasm and confidence and at a pace that cannot be stopped. In May, the United States produced and placed in commission and in service, 250,000 tons of deadweight capacity. I am sure May will be the least productive month we will have. We may be confident that if we maintain the same spirit as now is prevailing, we will not be disappointed.

"What is the necessity? I have enlisted in this work every plant that can do ship or accessory work. We have authorized or contracted for within the week new works aggregating in cost between $200,000,000 and $250,000,000, which will increase our ship capacity by 3,000,000 tons per year. The Great Lakes this year will produce between 400,000 and 500,000 deadweight capacity. Extensions have been provided whereby 1,000,000 tons will be produced next year. In January, 60,000 workmen were employed in the shipyards. Today there are 350,000. In addition, 350,000 are employed in the manufacture of engines and accessories.

"I am so proud of the people in the steel industry. Replogle is afraid

that we are not going to get enough steel. I am more optimistic and am not worrying much about that. Ships, you know, are first on the list. I know Replogle will give us the steel; I know the industry will produce the steel; and I feel sure there will be given us all the steel this year and next required to carry out our program. I know of no industry which has done more nobly by its country than the steel industry. I want you with me and I want to succeed. If I succeed, you succeed; if you succeed, the industry succeeds. In the end we will have the sense of patriotic satisfaction of having done our duty not because we are asked to do it but that we did it with love for our country, love for our fellowmen and love for each other."

At the conclusion of Mr. Schwab's address, Judge Gary declared if there should not be sufficient capacity to satisfy the ship program and other war demands, he pledged that the works will be extended and the capacity increased.

Replogle Enthusiastically Received

Mr. Replogle was given a great ovation when he arose to speak at the banquet.

"The last time I was privileged and honored to address you was about three years ago at the Chicago meeting, when I appealed to you for the establishing and maintenance of proper extras and differentials on various lines of steel products, he said:

"So far as proper prices, extras and differentials are concerned, you do not, at present, need any help from me, as this is now looked after in a more capable way by the official committee you have appointed, and my plea during the past 10 months is of a different kind. Extra tonnage of the important lines of steel products necessary to win the war! If there is one thing in the world of which I am positive, it is this fact that the direct and indirect war necessities of the United States and allied governments in this great emergency are such as to require the entire output of steel which you can make, at least for the balance of this year. 'War necessities' is rather a flexible term—and it has been given much thought and consideration of those in authority at Washington.

"I had a conference Wednesday with the representative of the corset industry. It developed that their profits last year from this great industry aggregated $40,000,000, and that they require 15,000 to 20,000 tons of high carbon spring steel annually.

"There have been many lists of so-called nonessential industries prepared at Washington, but they have never been officially issued, as there has never been complete agreements on this subject.

"All industries are essential from one standpoint or another—if no other, from the standpoint of the owner, and we have preferred to reverse the procedure and prepare a list of the more essential industries, giving them such preference in steel supply, fuel, transportation and labor as are necessary to get the results for which we are all striving.

Unfilled Orders Tremendous

"It may be surprising to many of you to learn that we now have unfilled orders on the books of the steel manufacturers and on our desks at Washington, for 16,800,000 tons of steel for the United States and allied governments and the orders are coming in at a greater rate than they are being executed, although I believe we are near the peak of production. Difficulties of some of our gallant allies are very great. Coal in Italy is $140 per ton, and their steel industries are working under great disadvantages. A very large percentage, probably 75 to 80 per cent of the steel and coal of France are now either in the hands of our enemy or within the range of his guns. The requirements of our allies will be enormous and the least we should do is all that we can do to give them steel when and as needed.

"The railroads of our country are more rails for safety and efficiency of operation, and it is difficult to give them any increase without restricting the production of projectile steel, which is largely rolled on rail mills. The forging plants are now getting under way and have just reached the point where their consumption of projectile steel will be an extremely heavy factor. The shipyards have their ways built and many keels laid, and under the direction of Mr. Schwab, will require vast tonnages of steel. His program for next year is at least double that of this year and we must furnish him the steel to complete the great work he has to do and for which he is so well qualified. The appointment of Charles M. Schwab was an epoch in this war—a great allied victory and one which caused great consternation in Germany. The expressions of approval of the representatives of the allied governments dealing with us, were of such a nature as to leave no possible doubt as to how it was received by them.

Praises Baruch Highly

"There has been another appointment in Washington which properly met with great approval—Bernard M. Baruch, chairman of the war industries board. He is a man of great ability, determination and quick decision and is doing wonderful work in this great fight to keep the world a decent place in which to live. My association with him has been such that I can say positively that every move he has made has been directed by fairness and he has done everything possible to promote and foster prosperity of industries, consistent with the one big object of winning the war. He has a most difficult position and is filling it with great efficiency. No important steps have been made by him without full consultation with the industries affected, and where possible, the ideas of the leaders of these industries have prevailed. Some of you gentlemen have felt that we on the war industries board have been, at times, critical and severe. There have been times before the acute necessities of war became known, that a few—a very few—manufacturers, we felt, had been governed a 'ittle too much by commercialism and did not devote sufficient of their product to the lines we felt most necessary, and we have not been slow in calling their attention to this fact.

"At the meeting some weeks ago in Judge Gary's office, when the 100 per cent pledge was adopted, I think there was a clearer understanding of the necessities of the situation and it is incumbent upon me to say, and I do say, with the greatest of pleasure, that today 100 per cent of the steel manufacturers of the country are do-

Pays Gary Tribute

AN impressive scene marked the point in Mr. Schwab's address where he paid a high personal tribute to Judge Gary. Laying his hand on the shoulder of the toastmaster, Mr. Schwab said, "You have been a true friend. I hope you always will be. You no more desire to be my friend than I hope always to be yours." The banqueters received this demonstration of affection and regard with great applause. Judge Gary in introducing the ship director said Mr. Schwab "could do more than anyone else to assist in putting into practical effect the sentiment of Lloyd George that we need ships, ships and more ships."

ing their utmost and that there is not a single exception to this rule. You are all doing wonderful work and with the history of this great cruel war, the work of the steel manufacturers will stand out in the most glowing chapters.

"I have often felt that one of the great achievements of history was accomplished at the meeting of the steel manufacturers and the war industries board in September of last year. The manufacturers realize fully that due to the abnormal conditions created by the war, that prices had risen entirely too high, and that the burdens of our gallant allies were already so heavy that the law of supply and demand must temporarily be abandoned. I do not think our wonderful President has made many more important or proper decisions than that our allies in this fight were entitled to the same prices on the materials necessary to win this war, as our own government. The steel manufacturers and the war industries board mutually agreed upon prices, which were officially approved by the President, and which, while involving reduction, in some cases as much as 75 per cent from the standards then prevailing, and which were constantly increasing, I think today are considered by all of you fair and reasonable. The differences in a year's output meant a saving of between two thousand and three thousand million dollars. There was no statute of law for this action and the war industries board was not vested with legal authority to compel such an action and it was, therefore, entirely a voluntary one on the part of the steel manufacturers, and is, I believe, one of the most glorious chapters of the war."

Other banquet speakers were Ex-Congressman J. J. Fitzgerald, of Brooklyn, Major General Glenn of Camp Sherman, Ohio, and Dr. Thomas Darlington of the welfare committee of the institute. Mr. Fitzgerald emphasized the great things that had been accomplished in the management of the war and bespoke a fair appreciation from the general public of what is being done. General Glenn pointed out the great danger to American economic progress of the future if Germany retains and utilizes the cheap labor and mineral resources of Russia. Dr. Darlington urged the necessity of the business man to carefully guard his health particularly under war conditions. He set forth what he termed "The Ten Commandments of Health".

The discussions of the various papers at the day's session were unusually good and were filled with original thought and information. "Conservation of Ferromanganese," presented by C. R. Endicott of the Bethlehem Steel Co., was discussed by A. W. Diehl of the Carnegie Steel Co., by G. B. Waterhouse, metallurgical engineer of the Lackawanna Steel Co., and by Dr. Richards of Lehigh University. Those who discussed the paper on "The Design of the Modern Blast Furnace Stack," by J. G. West Jr., general superintendent of the Jones & Laughlin Steel Co., were Geo. L. Collard of the Shenango Furnace Co., J. S. Fraser of the Pittsburgh Steel Co., and Walther Mathesius of the Illinois Steel Co. "The Relation of the Trade Papers to the Iron and Steel Industry," by B. S. Stephenson, resident agent of M. A. Hanna & Co., Pittsburgh, received attention from A. O. Backert, vice president of the Penton Publishing Co., Cleveland. J. R. Mills, district manager of the sales of the Carnegie Steel Co., Cleveland, and John A. Penton. The paper on "The Modern By-Product Coke Oven and Its By-Products," was presented by title as was also the discussion by Wm. A. Forbes, New York, chairman of the benzol committee of the United States Steel Corp. There was no discussion of the "Effect of Phosphorus in Soft Acid and Basic Open-Hearth Steel," by J. S. Unger, manager of the central research laboratory of the Carnegie Steel Co., Pittsburgh, but it was announced Bradley S. Stoughton would contribute something on this subject for the proceedings.

Prof. H. M. Howe, in discussing Mr. Robinson's paper, stated that there had never been a clear and satisfactory reason why crucible steel is better than bessemer or open-hearth. He believed, however, that the better control of conditions in the crucible method probably was the explanation. He could not see why electric steel is better than open hearth, unless similarly the conditions of this process were under better control. The electric steel method reproduces very closely the conditions of the crucible process. "In the open hearth you have such atmospheric and slag conditions as you can get, while in the crucible, you have such atmosphere and you might say such slag conditions as you wish," he said. Dr. Howe stated that electric steel promised to have a great part in the production of alloy steel, but its greatest part, it seemed to be, would be in finishing steel already made in the open hearth or bessemer. He said cheap freight rates of the future depended on rail life. It is necessary that rails have greater resistance which was to come from the electric furnace method. He thought the time was not far distant when standard practice in rail manufacture would be to make open-hearth steel and refine it in the electric furnace. Dr. John H. Mathews, president of the Holcomb Steel Co., Syracuse, N. Y., also discussed Mr. Robinson's paper.

At the meeting of the directors of the institute, Friday noon, the retiring officers were re-elected for the ensuing year.

Obituaries

William Bell Ullman, who formerly was actively identified with the iron and steel industry in Illinois, died recently at his

WILLIAM B. ULLMAN

home in Chicago. Had he lived until Oct. 7, he would have been 68 years of age. He was born in Racine, Wis., and after being graduated from Racine college, he located in Chicago in 1870. Eight years later, he became a partner of Davis Kelly in the wholesale iron business, under the firm name of Kelly, Ullman & Co. In 1884, Mr. Ullman moved to Moline, Ill., in order to accept the position of manager of the Moline Malleable Iron Co., and a few years later, he purchased the plant. Destroyed by fire in January, 1903, Mr. Ullman had it rebuilt at St. Charles, Ill., and in 1905, he sold out and returned to Chicago. Ill health has made him practically an invalid for the past 10 years.

James Sargeant, superintendent of the D. & W. Fuse Co., Providence, R. I., died at his home in that city, May 21.

War Board Receives Full Powers

Executive Order of President Under Overman Bill Makes Industries Body a Distinct Administrative Agency—Steel Director Replogle Now in Position to Employ Laws to Procure Production if Necessary

WASHINGTON, June 4.—The war industries board, and through its division of steel supply, which has long functioned as a subsidiary of the council of national defense and an auxiliary of the war and navy departments and the shipping board, now is a definite and powerful branch of the government. Formerly it derived by agreement with other authoritative bureaus only such meager powers as it exercised, but now, through an executive order of the President last week, it is "a separate administrative agency" functioning through such regular statutes as it may require.

The President acted under authority given him by the Overman bill. The executive order was brief and without detail. It had been expected the President would sum up, at least generally if not minutely, just what sections of existing laws he actually would transfer to the war industries board. This, however, may come later, possibly from Bernard M. Baruch, chairman of the board, whose status now is on a par with Fuel Administrator Garfield, Chairman McCormick of the war trade board, Food Administrator Hoover and Director General McAdoo of the railroad administration.

Baruch Has Much Power

In nearly every law affecting the military establishments, there are sections which more or less definitely have some bearing on the iron and steel industry but which formerly have been exclusively the administrative powers of the secretary of war, of the navy or of the chairman of the shipping board, as the case may be. While the President has not specified whether these powers have been or will be given to Mr. Baruch, it may be regarded as a fact that if Mr. Baruch should convince the President he needs the authority under certain clauses, the President, by authority of the Overman bill, and through Mr. Baruch, can transfer that legal power.

This means that J. Leonard Replogle, Mr. Baruch's director of steel supply, is to be the one who may administer any laws necessary in the regulation of the iron and steel industry for the production of war materials. Mr. Replogle cannot arbitrarily wield the power thus conferred upon him, but he may do so with the approval of Mr. Baruch, possibly of the President. However, all the laws now on the books are really at the disposal of the director of steel supply and if 100 per cent production cannot be obtained through voluntary response of the industry, Mr. Replogle may feel called upon to put some of the laws to use.

The war industries board occupies what is known as the council of national defense building. The President's order divorced the board from the council and now the council is to take up headquarters in the building just vacated by the fuel administration. The fuel administration has moved to Twentieth street and Virginia avenue N. W. Its former headquarters, the new home of the council, is at Eighteenth and C streets N. W. The war industries board remains at Eighteenth and D streets N. W.

The council of national defense now is to devote itself mainly to research work, looking to conditions after the war, at the same time cooperating in every way with all government work in the determination to carry the war through to victory. For the work contemplated, more room is required and the old fuel headquarters provides ample space for the task, another point of which is the general supervision of the work of state and subsidiary councils. The war industries board also is expanding, which is another reason for the council seeking a new home. One of the newest divisions under the board, and one which likely will play an important rôle in the distribution of war orders. This is the "resources and conversion section," for a time known as the "zoning of industries division", of which Charles A. Otis of Cleveland is chief. Under him is being developed the plan of establishing 20 zones throughout the country, each of which will know its own possibilities and be at the service of the various contracting departments of the federal government.

Another division of the board is the textile section, under John W Scott of Carson, Pirie, Scott & Co., Chicago. Both this and Mr. Otis' department are under the general supervision of George N. Peek, who came to the board as "industrial representative" with the general task in hand now undertaken by Mr. Otis. These divisions have been added since publication in THE IRON TRADE REVIEW on May 23 of the full list of the personnel of the board.

The long list has been revised again, this time tentatively as before. It is pointed out that the personnel is constantly changing because of army and navy orders, operation of the draft law, assignment of committeemen to other tasks, and the creation or elimination of other committees or branches.

One of the changes noted in the revised list is the appointment of W. W. Phelps as acting secretary of the price-fixing committee. Mr. Phelps is assistant secretary of the war industries board. H. P. Ingels, the board's secretary, has been acting secretary of the price committee but has been relieved of all duties except those directly affecting the board itself.

Priorities Commission Created

Another change is the creation of a priorities committee under the priorities division. This is really the old priorities division, but the new division is the link between the new committee and the priorities board, still a third priorities body. Judge E. B. Parker, chairman of the priorities committee, is commissioner of the priorities division and a member and vice chairman of the priorities board. His assistant, Charles K. Foster, is the only other member of the division as indicated in the revised list. To the board have been added Maj. Gen. Geo. W. Goethals, succeeding Brig. Gen. Palmer E. Pierce as the army's representative, and T. F. Whitmarsh for the food administration.

Under the building materials section, Maj. F. W. Leadbetter, representing the army, Charles V. York representing the navy, and F. K. Paxton the Emergency Fleet corporation, have been added and S. I. Marks of the navy and Capt. J. J. Mills of the army have been relieved. In the chain section Samuel Porcher of the railroad administration and E. C. Gillette of the department of commerce have been given assignments.

H. Ray Paige of the Nitrate Co., New York, for nitrates, and J. W.

Paxton, for salt, have been added to the chemicals and explosives section. Here also C. K. McDonalds has been transferred from mica, etc., to acids, sulphur, pyrites, caustic soda, etc., and C. G. Grimes has been made the mica representative. Mr. Blair has been placed in charge of dyestuffs. The last three represent the navy.

To the emergency construction committee have been added W. F. Long as assistant section chief and Lieut. J. B. Talmage. In the legal section the name of Adrian Ettinger has disappeared. Under the lumber section a new addition is M. E. Philprict. Another new section has been added for platinum, iridium and palladium, and is in charge of C. H. Conner, who also represents wood distillation products, and G. E. DeNike.

Government Fixes Manganese Ore Prices

WASHINGTON, June 3.—Manganese ore prices as recommended by the American Iron and Steel institute have been approved by the war industries board on the basis of the market values which have prevailed during the past month. The fixed schedule of prices became effective May 28. No announcement has been made as to the length of time it will be in force. In announcing the new schedules and the collateral conditions, the war industries board declared:

"A schedule of prices on manganese ores produced in the United States has been agreed to by the American Iron and Steel institute and has been approved by the war industries board. The prices are fixed at a figure higher than the prices on this ore that have prevailed in past months. The new price schedule is to be used on transactions taking place after midnight on May 28. No announcement is made as to the length of time that this schedule of prices is to remain effective.

"The following schedule gives domestic metallurgical manganese ore prices per unit of metallic manganese per ton of 2240 pounds for manganese ore produced and shipped from all points in the United States west of South Chicago, Ill. This schedule does not include chemical ores for dry batteries, etc. The prices are on the basis of delivery f.o.b. cars South Chicago, and are on the basis of all-rail shipments. When shipped to other destinations than Chicago, the freight rate per gross ton from shipping point to South Chicago, Ill., is to be deducted to give the price f.o.b. shipping point.

"For ore containing when dried at 212 degrees Fahr., metallic manganese:

Per cent	Per unit
35 to 35.99, inclusive	$0.86
36 to 36.99, inclusive	.90
37 to 37.99, inclusive	.94
38 to 38.99, inclusive	.98
39 to 39.99, inclusive	1.00
40 to 40.99, inclusive	1.02
41 to 41.99, inclusive	1.04
42 to 42.99, inclusive	1.06
43 to 43.99, inclusive	1.08
44 to 44.99, inclusive	1.10
45 to 45.99, inclusive	1.12
46 to 46.99, inclusive	1.14
47 to 47.99, inclusive	1.16
48 to 48.99, inclusive	1.18
49 to 49.99, inclusive	1.20
50 to 50.99, inclusive	1.22
51 to 51.99, inclusive	1.24
52 to 52.99, inclusive	1.26
53 to 53.99, inclusive	1.28
54 and over	1.30

"For manganese ore produced in the United States and shipped from points in the United States east of South Chicago 15 cents per unit of metallic manganese per ton shall be added to above unit price.

"Above prices are based on ore containing not more than 8 per cent silica and not more than 0.25 per cent phosphorus and are subject to

Silica Premium and Penalties

"For each 1 per cent of silica under 8 per cent down to and including 5 per cent premium at rate of 50 cents per ton. Below 5 per cent silica, premium at rate of $1 per ton for each 1 per cent.

"For each 1 per cent in excess of 8 per cent and up to and including 15 per cent silica there shall be a penalty of 50 cents per ton; for each 1 per cent in excess of 15 per cent and up to and including 20 silica there shall be a penalty of 75 cents per ton.

"For ore containing in excess of 20 per cent silica, a limited tonnage can be used; but for each 1 per cent of silica in excess of 20 per cent and up to and including 25 per cent silica; there shall be a penalty of $1 per ton.

"Ore containing over 25 per cent silica subject to acceptance or refusal at buyer's option, but if accepted shall be paid for at the above schedule with the penalty of $1 per ton for each extra unit of silica. All premiums and penalties figured to fractions.

Phosphorus Penalty

"For each 0.01 per cent in excess of 0.25 per cent phosphorus there shall be a penalty against unit price paid for manganese of ½ per cent per unit figured to fractions.

"In view of existing conditions, and for the purpose of stimulating production of domestic manganese ores, there will be no penalty for phosphorus so long as the ore shipped can be used to advantage by the buyer. The buyer reserves the right to penalize excess phosphorus as above by giving 60 days notice to the shipper.

"The above prices to be net to the producer; any expenses such as salary or commission to buyer's agent to be paid by the buyer.

"Settlements to be based on analysis of ore sample dried at 212 degrees Fahr. The percentage of moisture in ore sample as taken to be deducted from the weight.

Payments

Eighty per cent of the estimated value of the ore (less moisture and freight from shipping point), based on actual railroad scale weights to be payable against railroad bill of lading with attached certificates of sampling and analysis of an approved independent sampling chemist. Balance on receipt of ore by buyer. Actual railroad scale weights to govern in final settlement. Cost of sampling and analysis to be equally divided between buyer and seller."

Proper Form for Invoices of Navy Outlined

Washington, June 4.—A circular letter relative to rendering of certified invoices, forwarding of inquiries in connection with payments, differences, shortages, etc., has been sent out to contractors by Rear Admiral Samuel McGowan, paymaster general of the navy. The letter says:

"1. Contracts specifying delivery f.o.b. contractor's works, which show on their face the ultimate destination of the material—send invoices and inquires to the supply officers of the navy yards or stations at destinations.

"2. Contracts specifying delivery at some navy ward or station—send invoices and inquiries to the supply officer of that yard or station.

"3. Contracts specifying delivery at a navy yard for reshipment to another yard—send invoices and inquiries to the supply officer of the yard making the reshipment.

"4. Contracts specifying delivery f.o.b. works of contractors, which do not show on their face the ultimate destination of the material—send invoices and inquiries to the bureau of supplies and accounts.

"5. Contracts specifically providing for preparation of public bills in the bureau of supplies and accounts, regardless of conditions of delivery—send invoices and inquiries to the bureau of supplies and accounts.

"Public bills are prepared by the supply officers at the navy yards where the material is received in all cases except as noted in sections 4 and 5 above. Payments cannot be made by the purchasing office until after receipt of certified public bills either from the navy yards in cases of sections 1, 2 and 3, or from the bureau of supplies and accounts in cases coming under sections 4 and 5.

"Payments may always be expedited by sending invoices and inquiries to the office responsible for preparation of public bills, regardless of the office from which the order is received or from which payment is expected."

Men of Machinery Trade

Personal News of a Business Character Regarding the Men of Affairs of the Industry

W. P. PRESSINGER, formerly manager of the compressor and engine departments of the Chicago Pneumatic Tool Co., Chicago, has been appointed manager of sales. In 1887, he began his business career, with the Clayton Air Compressor Works, New York, remaining three years, rising to the position of manager of sales. In 1900, he organized the New York Air Compressor Co., of which he was secretary and general manager. One year later, it was absorbed by the Chicago Pneumatic and Mr. Pressinger has been manager of the air compressor department until his latest promotion. Other recent changes in the latter company's organization include the promotion of W. R. Callan, formerly Franklin, Pa., plant manager, to the position of general manager of plants with headquarters at Chicago; G. A. Rees, general purchasing agent, has been promoted to be manager of purchases and stores; H. D. Megart, formerly with the Bethlehem Steel Co., South Bethlehem, Pa., has been made assistant to the president.

C. G. Tarkington is in charge of the Mechanical Appliance Co. office at Washington.

W. B. Greenleaf, formerly located in Plymouth, Mich., was recently appointed superintendent of the Kohler Die & Specialty Co., DeKalb, Ill.

Palmer D. Weeks has resigned from the Dale-Brewster Machinery Co. and has organized the D. Weeks Machine Tool Co., 1270 Broadway, New York.

John Parker, formerly with the Cincinnati-Bickford Tool Co., has been made factory manager of the Spencer-Smith Machine Co., Howell, Mich.

Frank C. Lord, formerly superintendent of the Hobbs Mfg. Co., Worcester, Mass., has accepted the position of superintendent of A. Hankey & Co., Inc., Rochdale, Mass., maker of machine knives.

Eric V. Carlson, formerly with the Brown Hoisting Machine Co., Cleveland, who left the United States in April, 1914, to go into business in Nerka, Sweden, has returned to his former home in Worcester, Mass. He declares that the great majority of the Swedes today are against the Hun and that Sweden is not pro-German.

Carl M. Nelson recently became affiliated with the Dale-Brewster Machinery Co., Chicago, in its sales department, having resigned his position with the E. L. Essley Machinery Co., that city.

C. B. Pritchard was recently appointed superintendent of the Marion Machine, Foundry & Supply Co., Scottdale, Pa. He formerly was machine shop foreman of the Scottdale Machine Mfg. Co., that city.

William A. Viall, secretary of the Brown & Sharpe Mfg. Co., Providence, R. I., had the honorary degree of A. M. conferred upon him at the 150th annual commencement excercises of Brown University in that city, May 29.

Frederick F. Fuessenich, president and treasurer of the Hendey Machine Co., Torrington, Conn., celebrated his 70th birthday anniversary, May 7, by presenting to the town the property known as League Park, valued at more than $25,000.

John G. Zummach was recently made chief engineer and assistant factory manager of the Perfex Radiator Co., Racine, Wis. He until recently, was chief of the tool-designing department of the Mitchell Motors Co., Racine, Wis.

R. G. Stutsman has been made sales representative at Milwaukee for Manning, Maxwell & Moore, resigning as master mechanic of the Four Lakes Ordnance Co., Madison, Wis. He formerly was president of the frog and switch shop of the Chicago, Milwaukee & St. Paul railroad.

A. B. Hall, formerly Chicago sales manager and latterly vice president at Akron of the Whitman & Barnes Mfg. Co., affiliated with it for 21 years, now has supervision of all sales. R. S. Carter, formerly Pittsburgh representative of the company, has been promoted to be twist drill and reamer sales manager at Akron. H. E. Fisher, formerly with the Pittsburgh Model Engine Co., Pittsburgh, succeeds R. S. Carter as mechanical engineer and Pittsburgh sales manager. Paul E. Thomas, formerly affiliated with the Seaboard Air Line, Chicago, has been made wrench and spring cotter sales manager at Akron.

C. L. Campbell and C. B. Leeds were recently added to the machinery sales force of the Cadillac Tool Co., Detroit, Mich. Mr. Campbell was formerly with the C. A. Strelinger Co., of that city and Mr. Leeds was formerly with the National Automatic Tool, Co., Richmond, Ind.

Uldric Thompson, formerly chief engineer for the International Steel and Ordnance Co., and who supervised the equipping of the artillery ammunition assembly plant of the Rock Island arsenal has opened an office as consulting engineer under the firm name of Uldric Thompson Jr., Inc., at 120 Broadway, New York.

Cyrus N. Cowan, factory manager for several years for the Heald Machine Co., Worcester, Mass., has been obliged to relinquish his duties on account of sickness which confines him to his home. He was succeeded June 3 by R. W. Ellingham, works manager of the Bilton Machine Tool Co., Bridgeport, Conn.

Maj. John F. Tinsley, general manager of the Crompton & Knowles Loom Works; George N. Jeppson, works manager of the Norton Co., and Frank H. Willard, assistant general manager of the Graton & Knight Mfg. Co., all of Worcester, Mass., have been appointed by the fuel committee of that city to have charge of the conservation of coal and prevent waste in heat in the factories of Worcester.

Ralph A. Walters, an assistant superintendent for the American Bridge Co., Pittsburgh, has been requisitioned by the United States Steel Corp. as superintendent of steel construction and installation of machinery of the new ordnance plant at Neville island, O., for the United States government. Mr. Walters, who is 33 years old, has been with the American Bridge Co. since graduating from the Worcester Polytechnic Institute, Worcester, Mass., in 1906.

Men of the Iron Trade

Personal News of a Business Character Regarding the Men of Affairs of the Industry

ALFRED O. SONNE, who was recently appointed resident manager of the Chicago office of Rogers, Brown & Co., succeeding the late E. L. Billingslea is typically a Chicago man. He was born in that city and has never lived in any other, though he has traveled widely through the industrial portions of the United States. He obtained his education in the Chicago public schools, being a graduate of Englewood high school, and entered the office of Rogers, Brown & Co. eighteen years ago as office boy. In the years since he rose through various positions of increasing importance in the organization until he became assistaant to Mr. Billingslea, who was resident partner. Through his long service he is in close touch with the foundry industry in the west and has a wide acquaintance. He is a member of the Chicago Foundrymen's club and has been active in the work of the various meetings of the American Foundrymen's association held in the west.

Thomas Finigan was recently elected vice president of the American Brake Shoe & Foundry Co. His headquarters are at Chicago.

J. L. Gillespie has been made advertising manager of the Aspromet Co., First National bank Building, Pittsburgh.

W. H. Williams, formerly of Racine, Wis., has moved to Minneapolis to become superintendent of the Flour City Iron Works there. His address is 2105 Twenty-sixth avenue, South.

Patrick T. Kilgarriff has been made vice president of the Certes Supply Co., St. Louis. He has been chief clerk to T. C. Powell, vice president of the Southern railroad, Cincinnati.

L. E. Thomas, formerly chief draftsman for the National Tube Co., Lorain, O., is chief engineer of the government ordnance plant on Neville island, near Pittsburgh, being built by the United States Steel Corp.

Bert M. Pettit, who at one time was advertising manager of the J. I. Case Threshing Machine Co., Kenosha, Wis., but who lately has been advertising manager for the J. I. Case Plow Works, Racine, Wis., was recently made secretary of the Wallis Tractor Co., Racine. This interest is closely identified with the Case works..

William F. Cutler was recently elected president, and Frank C. Turner was elected vice president in charge of sales of the Southern Wheel Co.

ALFRED O. SONNE

Both are located in the company's St. Louis office.

George W. Agerter will have charge of tool steel sales in the Pittsburgh district for the Ludlum Steel Co., Watervliet, N. Y. He formerly was with the Hunter Saw & Machine Co., and later with the Pittsburgh Saw & Mfg. Co., Pittsburgh.

H. G. Spilsbury, metallurgical engineer for the Metal & Thermit Corp., who has had charge of the alloy sales in the Pittsburgh district, moved to New York recently and his headquarters will be in the home office of the corporation in the Equitable building.

Holmes Forsyth has been elected president of the Curtain Supply Co., Chicago, to succeed the late Edward T. Burrowes. He has been second vice president, secretary and general manager for some time, and as secretary he is succeeded by Randolph S. Reynolds, formerly assistant to the general manager.

Charles A. McCune became sales engineer for the Page Steel & Wire Co., 30 Church street, New York, upon his resignation as chief engineer of the Commercial Acetylene Co., that city. He will devote his effort to the sale of and service in connection with "Armco" welding rods.

Walker C. Conner Jr., New York, was recently appointed assistant manager for the New York district of the United States shipping board, transportation division by Frank C. Joubert, manager. Mr. Conner will look after the supplies and materials, through the various terminals, which are going into the construction of ships.

George N. Jeppson has declined the position of trustee for the Grafton, Mass., state hospital, tendered him by Governor Samuel W. McCall. He is works manager for the Norton Co., Worcester, Mass., and is serving on the army selective board. These duties and others public and private do not permit his accepting the appointment.

John R. Caldwell, who until recently was in the Washington sales office of the General Fireproofing Co., Youngstown, O., has been granted a captain's commission in the ordnance department. He has been placed in charge of hand grenade production. He formerly was central district sales manager of the General Fireproofing Co., with headquarters in Youngstown.

George B. Malone, who has served as superintendent of the welding and turbine blade department of the Remington Arms-Union Metallic Cartridge Co., Bridgeport, Conn., has received a captain's commission in the engineer reserve corps. He has reported in Washington and will be assigned the duty of organizing welding schools there as well as in the various cantonments.

J. J. Tynan; general manager of the Union Iron Works, San Francisco, accompanied Joseph W. Powell, vice president of the Bethlehem Shipbuilding Corp., Ltd., on an inspection tour of the Fore River and Squantum, Mass., plants, May 27. He said that preparations were being made to launch nine ships at the Union yard when Charles M. Schwab visits San Francisco, July 4.

Iron and Steel Men in War Machine

C. E. Hoyt, Secretary, American Foundrymen's War Service Committee

CHARLES E. HOYT has been bringing the foundries of the United States into touch with the government. As secretary of the American foundrymen's war service committee, he has made a survey of the gray and malleable and steel foundry industry of the country. The government itself is not a heavy buyer of castings. It confines its purchases to hand and rifle grenades, trench mortars and a certain type of shell. This survey however, furnished contractors and subcontractors with a direct source of information for the placement of tonnages with plants best equipped to handle them. These tonnages include every conceivable casting entering into ordnance work. Both direct and indirect war work are affected. Data thus collected includes plant capacity, extent of government and railroad work on books, etc.

Mr. Hoyt has handled this work in his customary efficient and energetic manner. His committee has been called into frequent consultation with ordnance officers with reference to plant equipment as well as the preparation of specifications for gray iron and semisteel shells. Largely through this effort, a number of foundries now are conducting a a series of experiments with semisteel shells. As a result, a vast tonnage for more efficient and expeditious shell production will be opened up.

It was this committee which pointed out to authorities in Washington the threatened shortage of foundry iron due to the allocation of tonnages of steel-making grades to furnaces making foundry iron and also the fact that many furnaces operating on foundry iron, intend to make only steel-making grades after July 1.

When the American Foundrymen's Association Inc., decided by resolution last September to operate a war service committee in Washington at its own expense, to aid the government in its casting purchases, Mr. Hoyt was the natural selection for committee secretary, serving that body as exhibition manager since 1909.

Not many years ago, since he is still a young man and not over 45, he pounded sand and poured iron in his father's foundry in Wayland, Mich., where plows were produced. Upon being graduated from Michigan Agricultural college, he served for a while as instructor. He returned to Wayland to take charge of the foundry upon his father's death, but later was called to the Lewis Institute, Chicago, to serve as foundry instructor. He remained affiliated there for about 20 years, becoming head of the foundry department. While in that capacity, he commenced his exhibition activity. The Chicago Foundrymen's club decided to exhibit some of the work of the institute's students. This attracted considerable attention. When the Foundry & Machine Exhibition Co., which conducted the exhibitions held in conjunction with the annual meetings of the American Foundrymen's association needed the services of an exhibition manager, they employed Mr. Hoyt until 1909.

CHARLES E. HOYT

Iron and Steel Financial News

Up-to-the-Minute Fact and Comment Collected and Sifted For Busy Readers

Drive and Taxes Puzzling Business

GERMANY'S present offensive takes first place, above all other factors, in the financial markets. In the stock market, as among business men generally, the war news has been read with considerable perplexity. So many questions, relating to the military situation, remain obscure, that it has been difficult to draw any conclusions. Nevertheless, no matter what untoward developments may arise, the feeling has been one of optimism for the "long pull". Judge Elbert H. Gary expressed this sentiment clearly at last week's meeting of the American Iron and Steel institute, when he said: "For the long future I am an optimist. I believe we will win the war. Why will we win it? Because we are right; we ask for nothing that is of pecuniary benefit to us, and which belongs to anyone else." Judge Gary made some other interesting statements that put heart into the stock market when things were looking rather blue. He pointed out that the steel trade is putting its affairs in better shape; that while the industry may not be making much money, it is putting its works in better condition; and that after the war the trade will be better prepared than ever before in the competition for international trade. The statement by J. Leonard Replogle, steel representative on the war industries board that direct and indirect needs of the allies were sufficient to keep all mills of the country busy for a year at least also indicated the present stable character of the trade and gave heart to the holders of the steel shares.

Taxation Affects Stock Values

The stock market has moved off slightly the past week, steel shares generally losing from one to three points, in the face of the most critical military situation since the first battle of the Marne. And this decline appears to have been more the result of taxation proposals than of anxiety on the score of military reverses. President Wilson's speech before congress, showing that a new tax bill would be necessary during the summer, was followed by a sharp break in prices. In some quarters it was feared the excess profits and income taxes would be so large as to affect dividends adversely. However, the general feeling is that the administration will not countenance a revenue measure that would jeopardize the business of the country. The government is spending an increasing amount of money each month. The treasury department estimates present expenditures at about $1,500,000,000 and predicts that $2,000,000,000 will be the rate before the close of the present year, as deliveries of ships, guns, airplanes and other goods contracted for increase. Congress has already appropriated $12,000,000,000 for the army, for the coming year, or as much as the total amount spent by the government the last year. At any rate, one point in the tax question of importance is that the new bill be framed and disposed of early enough in the next fiscal year to afford business men an opportunity to prepare for it, instead of being forced to muddle along for a half year in the dark, as was the case in the present legislation.

Toluol Price

For Commercial Requirements Fixed —Aimed at Excessive Quotations

New York, June 1.—The toluol committee of the war industries board, after investigating the situation surrounding charges of $5 and $6 per gallon by some producers, on toluol released for essential commercial requirements, has extended the price for government needs to quantities thus released. This price is $1.50 per gallon at producers' plants for tank cars. On drums released for commercial consumption, the price will be $1.55 per gallon. These prices apply to all toluol to be released for June delivery. It is possible that they may be revised later. It is understood that any attempts to secure higher prices will result in commandeering.

The government's inquiry for future solvent naphtha is exerting a bad effect on the market. Not having any assurance as to when they can expect deliveries, consumers are averse to closing. Prices continue unchanged at 18 to 22 cents per gallon for contract, and 18 to 25 cents for spot shipment.

Prices on pure benzol have settled down to 25 to 30 cents per gallon both spot and contract. The lower prices are attracting some inquiry. Producers now have the largest stocks in months.

A fair amount of spot phenol which has accumulated mainly as a result of the refusal of the government to license exports other than for deliveries on contracts with allied governments, is being offered at 48 to 52 cents per pound. Practically no naphthalin is being sold. Producers estimate they are about 6,000,000 pounds behind in deliveries. The price is nominal at 10 to 12 cents per pound.

Practically all the sulphate of ammonia now being produced is going to the government. The market is nominal at $5.65 to $5.75 per 100 pounds at tidewater, for spot lots.

Coke Oven By-Products

Spot

Per Gallon at Producers Plant	
Pure benzol	$0.25 to .30
Toluol (on sales sanctioned by governm't) (tank cars)	1.50
Toluol (drums)	1.55
Solvent naphtha	.18 to .25
Per Pound at Producers Plant	
Phenol	$0.48 to .52
Naphthalin (nominal)	.10 to .12
Per 100 Pounds at Seaboard	
Sulphate of ammonia	$5.65 to 5.75

Contract

Pure benzol	$0.25 to .30
Toluol	no market
Solvent naphtha	.18 to .22
Per Pound at Producers Plant	
Phenol nominal.	
Per 100 Pounds at Seaboard	
Sulphate of ammonia	nominal

War Needs Dominate Tool Market

May Marks Definite Stride Towards Elimination of the Nonessential Machine Tool—Railroads and Shipyards Furnish Steady Demand for Equipment—Inquiries Still Are Increasing in Volume

EACH recurrent phase of the great war creates a definite reaction on the machine tool market. Increasing pressure on the west front, the active drive, the consequent consumption of great quantities of munitions, and the steadily increasing momentum of America's great war machine are all marked by reflex conditions in the machine tool industry. Slowly but surely the full strength of production of every class of metalworking machinery is being directed into war channels. Eventually machines not actively needed for the production of some item essential either directly or indirectly will no longer be produced. The past month has pointed this fact sharply and decisively. Indefinite promises of delayed deliveries are not forthcoming in response to inquiries for machines for nonessential use. Unless the essential character of the work for which the machine is intended is evident, many builders are refusing to quote to dealers. Available plant facilities are needed for the manufacture of machines which will produce ordnance, munitions, army transport equipment, ships and locomotives and cars.

Lull is Evident in Early May

THE first week of May represented a low point in the demand for new equipment. The buying incident to speeding up to compensate for the munitions consumption in the March drive had fallen away, and the new contracts had not yet appeared. Great quantities of munitions of what is known as the inert, or nonproductive class had been used in stopping the German drive. This class of munitions, includes projectiles, grenades, etc. Speeding up on existing contracts ensued to supply the deficit. The result was a steady demand for supplementary machines. The ordnance program was still under consideration, shell steel was going through the mills in great quantities, but no new contracts had been allotted. Confirmation of the reports that the United States Steel Corp. was to construct a huge ordnance plant, followed by the announcement that the Midvale Steel and Ordnance Co. was to enter into a similar undertaking introduced the prospect of large equipment demand. It was announced that practically $15,000,000 worth of machines would be required for these two plants. Col. H. W. Reed in addressing the machine tool builders in convention at Atlantic City, put the situation squarely before the industry when he announced that only about $1,500,000 of the needed equipment for these two plants was in sight. He stated that the builders faced the condition which necessitated the abandonment of the nonessential machine.

Shipbuilding Inquiries Gather Volume

EXISTING shipyards have in many cases taken steps to double their capacity during the past few months. These in addition to the new ventures in ship construction have furnished a cumulative demand for equipment which has made great progress throughout May. The Bethlehem Steel Co. recently announced the erection of two yards which will be commenced in the near future. The Federal Shipbuilding Co., New York; the New York Shipbuilding Co., Camden, N. J.; the American International Shipbuilding Co., Philadelphia; the Newport News Shipbuilding & Dry Dock Co., Newport News, Va., and the American Shipbuilding Co., Cleveland, have all figured as active buyers of machine tools. These companies and others in shipbuilding lines have also contributed to develop the most active crane market which has been noted for some months. Additional inquiries have appeared from a wide range of sources. Ship Director Schwab within the week has announced that $200,000,000 to $250,000,000 is to be spent quickly for shipyard extensions. The navy has been a steady inquirer for cranes during the past month, and has also taken bids on a large number of miscellaneous machine tools.

The Railroads Enter the Market in Force

VAST machine tool requirements are involved in the domestic transportation phase of the war. The railroads, obviously, must maintain their equipment in the best possible condition to stand the severe strain of war time burdens. For the past few years there has been an apparent laxness in keeping up the equipment in railway shops throughout the country. Extensive machine tool lists prepared with care from the recommendations of master mechanics and motive power engineers have furnished a convenient outlet for economical instincts of purchasing agents and railway executives who have wielded the power of veto. The result of this policy has been evident in the past and became acute during last winter. Existing shop equipment in many cases was entirely inadequate to handle needed repairs. During the past month a great volume of requirements has developed from this source. Railroads throughout the east and middle west have come into the market with specifications covering every class of equipment for their shops from cranes to pipe-threading machines. The Chicago, Burlington & Quincy, the Pennsylvania lines, the New York Central lines have all entered the market, and in most cases lists are extant at the present time. Some difficulty is anticipated in meeting the requirements for heavy machinery contained in these lists. No change in method of specifying equipment, nor in the routine of receiving quotations has developed due to the government control of the railroads.

Interesting Market Angles Have Appeared

WITH the appearance of varied war constracts, interesting phases of the machinery market have developed. In the Chicago district contracts for the manufacture of gray iron hand grenades have produced considerable inquiry for miscellaneous light tools. It is reported that contracts for about 100,000,000 hand grenades out of about 250,000,000 to be let have been placed. In the same locality a number of contracts for a new type of knuckle knife for trench use require light machinery. The Japanese navy has been inquiring in both the eastern and middle western markets for a large list of machinery for navy and shipyard purposes. Private interests from both Japan and China have further demonstrated the appreciation of American tools in the Orient by appearing in the various machine tool centers. The shortage in many lines has prevented the sale of equipment to these sources, and in one or two cases, the agents have sought to fill their requirements in Canada.

Railroad Tool Inquiries Increase

Transportation Agencies Furnish the Greater Bulk of Machine Tool Requirements—Railroad Lists Are Large in the Central and Western States—Crane Market is Active

TRANSPORTATION occupies the most important position in public attention at the present time. Getting the army across to France is speeding up the effort of every agency involved. Reflecting this situation, the machine tool industry is directing its energies toward supplying the needs of the railroads and the shipyards. In the central and western states extensive lists of equipment needs have been furnished by the railway shops, while new shipyard construction is providing an immense volume of inquiry. The railroad lists which have appeared during the past week will be open until the middle or latter part of June in most cases. Munitions and ordnance work has for the present been eclipsed, though there is a steady inquiry coming from those plants already engaged in war work. Some pointed comment has been indulged in by the trade relative to the apparent delay in issuing a comprehensive list of requirements for the two new ordnance plants to be constructed by the Midvale Steel & Ordnance Co., and by the Steel corporation. Some opinion is critical to a marked degree, but in other cases the point is suggested that the tools required may be purchased from time to time by the department, without designating that they are part of the equipment needed for these enterprises. An increase in the number of small plants which are extending their plant facilities is an evidence of the wider distribution of munitions work. The opinion is expressed that this distribution will be even more evident in the near future, owing to the tremendous tonnage of finishing work to be handled. Shipbuilding interests are providing the bulk of the inquiry for cranes, although various government departments and a large number of inland industrial plants contribute their portion. The crane market is continuing active, although the bulk of the inquiries extant for the past week still are open. New shipyards in contemplation will provide future demand.

Shipbuilding Plants Provide Equipment Demand

ADDITIONAL heavy demands are expected to be made shortly upon the eastern machine tool trade as a result of further huge expansion in the shipbuilding industry. According to authoritative reports, the New York Shipbuilding Co., Camden, N. J., and the Newport News Shipbuilding & Dry Dock Co., Newport News, Va., will be in the market soon for more than $1,600,000 worth of machine tool equipment. This equipment, it is understood, will be required for the proposed extension at the yard of the New York Shipbuilding Co. A large turbine plant is to be erected by the Newport News Shipbuilding Co. at Richmond, Va. Although final specifications have not as yet been issued, it is understood that the requirements will involve principally heavy tools. Both the Newport News Shipbuilding Co. and the New York Shipbuilding Co., are in the market at the present time for a number of electric cranes, in addition to those recently purchased by the latter. The bureau of yards, navy department, Washington, will receive bids until June 17 under specification 3036 for about $25,000 worth of core ovens for brass foundry work.

The vast machine tool requirements of the two yards to be erected by the Bethlehem Steel Shipbuilding Corp. have yet to be announced. It is expected, however, that action may be taken before the end of this week. An allotment of the cranes needed for these yards, numbering almost 250, is being looked for from day to day. No announcement has yet been made as to where the yards will be located. Other shipbuilders now in the market include the Standard Shipbuilding Co., Shooters Island, N. J., and the Groton Iron Works, Groton, Conn., both companies having lists out for a fair-sized number of miscellaneous tools. The Foundation Co., 233 Broadway, New York City, has lately closed on a large number of used machine tools for its new yard at New Orleans, and at present is inquiring for nine 2-ton hand cranes. The government has recently closed bids on about 60 tools, including a number of lathes, milling machines and grinders, for the Brooklyn and Philadelphia navy yards. Action by the Wright-Martin Aircraft Corp., New Brunswick, N. J., on its latest list of tools has been temporarily postponed, pending revision in specifications. The huge requirements of the two ordnance plants to be erected by the Midvale Steel & Ordnance Co. and the United States Steel Corp. are not yet announced officially. Despite the large volume of business now up, however, actual trading during the past week has been relatively small.

Crane Inquiries are Large

This situation also applies to the crane market, for although the greatest amount of business in months is now before sellers, the number of orders placed have been few. The largest inquiry to come out during the past week is that of the Newport News Shipbuilding & Dry Dock Co., which is asking prices on 29 overhead cranes, ranging in capacity from five to 70 tons. The Vulcan Iron Co., Wilkesbarre, Pa., is inquiring for one 30, one 20, and three 10-ton electric cranes. The Groton Iron Works Co. is in the market for five or six overhead cranes of five to 10 tons capacity. The J. G. Brill Co., Philadelphia, will buy one 20-ton crane and one 5-ton. The Hay Foundry & Iron Co., Newark, N. J., is inquiring for four 10-ton electric cranes. The Champion Engineering Co., Kenton, O., has been awarded a contract for five 10-ton electric cranes for installation in the boiler shop

TESTED

LIKE yelling, mud-bespattered Poilus who are first to go "over the top" when the signal is given to charge across the waste of "No Man's Land," Agathon Alloy Steels have been tested by the touchstone of actual service—long service.

The brave boys of France are high-spirited, for they see beyond that hour of carnage the holiday of respite in the rest billets, and still further beyond, that glorious day when France will be cleared forever of the menacing bands of autocracy.

But for Agathon Alloys there is no rest from the gruelling, grinding, strength-testing bombardment which actual service imposes. But there are no cowards among Agathon Steels.

Agathon Alloys will serve your purpose best because they have been made and tested for the word

The Central Steel Company

Massillon, Ohio

Agathon City

SALES OFFICES:

Detroit Office: 326-27-28 Ford Bldg. F. Walter Guibert, District Representative.

Cleveland Office: Hickox Bldg. The Hamill-Hickox Company, District Representative.

Chicago Office: 1370 People's Gas Bldg., 122 So. Michigan Blvd. C. H. Beach, District Sales Manager.

Philadelphia Office: 603 Widener Bldg. Frank Wallace, District Sales Manager.

Syracuse Office: 621 University Blk. T. B. Davies, District Sales Mgr.

J. E. Dockendorff & Co., 20 Broad St., New York. General Export Agents.

AGATHON
ALLOY STEELS

now being erected by the Standard Shipbuilding Co. at Shooters Island, N. J. The General Electric Co. is inquiring for a 30-ton overhead crane for its plant at West Lynn, Mass. The bureau of yards and docks, navy department, is inquiring for cranes for aero storehouses under specification 3028. These will be let on June 10.

Railroad Demand is Extensive

CHICAGO dealers in machine tools base their expectation of continued strong demand for equipment on renewed activity among railroads and the fact that increased demand for war materials is coming to this district. The Rock Island railroad has put out a number of small inquiries which aggregate considerable equipment and the New York Central railroad has asked for bids on 30 tools, mostly of large size. The Chicago, Indianapolis & Louisville railroad is asking bids on 18 tools, including lathes, planers, boring mills and air compressors. Manufacturers appear to be falling behind on their deliveries in many cases, and while 30 days delay is usually considered almost unavoidable, tools now are running three to four months behind promises. The Henry Lindahl Machine Co., Chicago, is building a machine shop. The Jenkins Machine Shop, Sheboygan, Wis., will build a 3-story machine shop. Fairbanks-Morse & Co. are having plans made for a foundry at their Beloit, Wis., plant. The Globe Shipbuilding Co., Superior, Wis., will build a machine and molding shop. The Burrougs Adding Machine Co., Detroit, will build a 5-story plant addition. The Wilson Foundry & Machine Co., Pontiac, Mich., will build a machine shop addition.

Railway Requirements Predominate

INTEREST in the Cleveland district centers about railroad tool requirements, although some new munitions contracts are serving to divide attention. The Grant Motor Car Corp., Cleveland, still is in the market for a number of miscellaneous tools for use in connection with a new contract for 6-inch shells. The Templars Motor Corp., Cleveland, which has been engaged for some time in shell manufacture will purchase some new equipment for this class of work. The Eclipse Stove Co., Mansfield, O., will build a plant addition in the near future. The Roderick Lean Co., Mansfield, O., will build a plant for the manufacture of farm implements. The Lake Erie and Western have issued the following list of machine tools needed for replacement purposes: One 6-inch American radial drill; one Racine No. 5 power hack saw; one Ding's metal separator; one No. 2 Cincinnati universal grinder; one Niles double-headed car axle lathe; one Gould & Eberhart heavy duty 23-inch shaper; one 1½ Acme double-headed bolt cutter; two standard bench drill presses; one 3¼ Underwood cylinder boring machine with head to bore 25 inches. The New York Central list of about 30 tools which was issued last week has been supplement, as was announced in the May 30 issue of THE IRON TRADE REVIEW. The complete list to date is given on this page. The American Shipbuilding Co. is in the market for the following machines and tools: Three 48-inch plate punches, 1¼ x 1¼ inches; one 48-inch plate shear, 1¼ inches; one 54-inch combination head punch and shear; seven 54-inch punches, 1¼ x 1¼ inches; two 54-inch plate shears; one angle shear for light sheets; two 36-inch punches, 1¼ x 1¼ inches; one horizontal punch, 1¼ x 1¼ inches; two 18-inch x 6-foot engine lathes; one 18-inch x 10-inch turret lathe; one 24-inch x 8-foot engine lathe; one 12-inch monitor lathe; one 48-inch x 20-foot engine lathe; one 30-inch x 12-foot engine lathe; four 20-inch x 10-foot engine lathes; one 24-inch x 12-foot engine lathe; one 16-inch x 12-foot engine lathe; one 52-inch x 27-foot engine lathe; one 18-inch x 5-foot engine lathe; one 34-inch x 16-foot engine lathe; one 30-inch planer; one 24-inch shaper; one 16-inch slotter; one 3-foot radial drill; four 25-inch drill presses; two wall radial drills, 15-foot arm; two wall radial drills, 18-foot arm; one 36-inch drill press; one 30-inch drill press; one No. 3 universal milling machine; one No. 4 plain milling machine; three No. 5 universal milling machines.

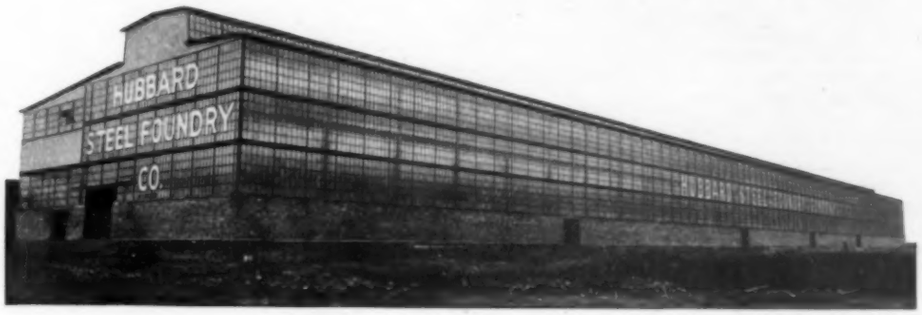
The National Roll & Foundry Co., Avonmore, Pa., recently has taken an order for two hydraulic flanging presses and an unusually large set of bending rolls from the Southwark Foundry & Machine Co., Philadelphia. The bending rolls are to be used for bending ship plates.

New York Central Issues Extensive Tool List

SUPPLEMENTARY to a list of about 30 machines for which an inquiry was in the market last week, the purchasing office of the New York Central lines at Cleveland has submitted specifications for about 55 additional tools. The complete list of equipment desired at the present time is given herewith. In addition the railroad will purchase a 10-ton traveling crane of about 46-foot span.

One 102-inch turning and boring mill for tires; two 24-inch high-duty shapers; one 36 x 36-inch by 12-foot Cincinnati planer; one 4-inch turret lathe; one 18-inch x 8-foot lathe with Fox attachment; one 24-inch x 7-foot engine lathe; one 1½-inch Landis bolt cutter; one 30-inch power cold saw; one 24-inch slotter; one 30-inch engine lathe; one 24-inch engine lathe; one 24-inch high-duty shaper; one 18-inch engine lathe; one 96-inch, 600-ton hydraulic driving wheel press; one 42-inch heavy-duty planer; one 6000-pound steam hammer; one 3½-foot Cincinnati-Bickford radial drill; one 102-inch boring and turning mill; one punch with 12-inch throat; one 42-inch Bullard boring mill; one No. 4 universal milling machine; one Universal tool room grinder; one 2-inch double head bolt cutter; one 18-inch x 8-foot engine lathe; one 32-inch table drill press; one 24-inch x 8-foot engine lathe; one 26-inch x 10-foot Pond back geared engine lathe; one No. 13 Brown & Sharpe universal grinder; one No. 4 universal milling machine; one No. 20 Gardner combination grinder; one 3-inch x 36-inch J. & L. turret lathe; one No. 3 Lennox rotary bevel shears; one 24-inch high-duty shaper; one 1¼ to 2-inch pipe cutting machine; one 90-inch driving wheel lathe; one drill press for ¾ inch; one 60-inch heavy-duty horizontal boring mill; one 24-inch high-duty shaper; one high-duty double end axle lathe; one power bending brake; one ¼ to 4-inch pipe threading and cutting machine; one automatic buffing machine for head light reflectors; one 42-inch car wheel turning lathe; one heavy duty bulldozer; one emery grinder; one single end bulldozer furnace and blower; one double chamber single end bulldozer furnace and blower; one 2B universal milling machine; one 42-inch Bullard vertical milling machine; one 30-inch x 10-foot extra heavy engine lathe; one combination tool and drill grinder; one mortising and boring machine; one 24-inch universal rip saw; one 4-inch pipe threading machine; one 4-spindle stay-bolt threading machine; one tinners squaring shears; one 16-inch x 8-foot lathe; one 2¼ x 24-inch turret lathe; one 24-inch x 7-foot engine lathe; one bolt forging machine; one high speed drill press; one 30-inch power cold saw; one No. 3B Kearney & Trecker milling machine; one 60-inch heavy-duty drill press; one 24-inch x 8-foot engine lathe; one portable threading and cutting machine; one 48-inch throat combination punch and shear; one 36-inch cut-off saw, one 18-inch x 10-foot engine lathe; one pipe cutting and threading machine; one steel power bending machine; two 4-spindle angle-cock grinding machines; one 48-inch throat combination punch and shear; two 3 x 18-inch emery grinder; one 30-inch x 8-foot engine lathe; one 36-inch self-feed power rip saw; one 20-inch jointer; one universal woodworking machine; one No. 31 Fay & Eagan heavy planer and smoother.

SPEEDING with ROLLING MILL JIM



Say Fellows! you remember the first of March I told you the "Hubbard" broke ground for a new foundry? Well here's a picture of her, she started with a BANG, June 3rd. Just 93 days! She has ***some*** up-to-date equipment in her, installed by ***some speed artists,*** I'll say: electric furnace, open hearth furnace and all that swell stuff. Pike her off for yourself!

So long,

Rolling Mill Jim.—

Hubbard Steel Foundry Co.

EAST CHICAGO, IND.

All Kinds of Iron and Steel Rolls and Steel Castings.

New Construction and Equipment

Concise and Timely Business Building Opportunities from the Field of Industry

Among New England Factories

WATERVILLE, ME.—The Lockwood Co. plans to erect a hydro electric power plant, one story high, 28 x 175 feet. Bids will be received shortly by Engineer I. W. Jones, Milton, N. H., on the two units of 1200 horsepower each which are to be installed.

BOSTON.—Plans are being drawn for a steel and concrete 7-story, 300 x 375-foot addition, to cost $500,000, for the Gillette Safety Razor Co., South Boston. Charles T. Main is the engineer in charge.

BOSTON.—The B. L. Sawyer estate has let the contract for a reinforced concrete, fireproof, 6-story, 78 x 92 x 141-foot public garage, to cost $150,000.

BOSTON.—The Mason Regulator Co. is receiving bids through engineers Desmore & McClear for a 3-story, 80 x 160-foot factory building.

EAST BOSTON, MASS.—Plans have been figured for a boiler tube storage building for the Hodge Boiler works. Charles T. Main, Boston, is the engineer.

FALL RIVER, MASS.—The Osborne Mills will build a brick, 2-story, 81 x 107-foot building, to cost $30,000.

HYDE PARK, MASS.—Bids have closed for a fireproof, 3-story, 80 x 160-foot factory for the Mason Regulator Co., 1605 Hyde Park avenue. Densmore & LeClear, Boston, are engineers.

IPSWICH, MASS.—The Ipswich Mills will build a brick, 2-story, 100 x 100-foot storehouse.

NATICK, MASS.—The Northway Motor Corp. is receiving bids on a 1-story, 200 x 600-foot building.

WINCHESTER, MASS.—The Whitney Machine Co. will erect an addition to its shop.

PROVIDENCE, R. I. — The Taft-Pierce Mfg. Co. will enlarge its Woonsocket plant by the erection of a brick addition to cost about $60,000.

PROVIDENCE, R. I.—For relieving freight congestion on the main line to Boston, a new section of track is to be built by the New Haven railroad from Hebronville to Foxboro, a distance of about 18 miles.

PROVIDENCE, R. I.—The New Haven railroad is building a coaling station at East Junction. The station is to be fitted with modern mechanical appliances and cost will be $35,000.

BRIDGEPORT, CONN.—A permit has been issued to the Bilton Machine Tool Co. to erect a concrete and steel, 1-story building.

BRIDGEPORT, CONN.—The Lake Torpedo Boat Co. is contemplating erection of two machine shop additions.

BRISTOL, CONN.—Bids are being received by Architects Unkelbach & Perry for three buildings for the Dunbar Bros. Co. Two of the buildings will be four stories, 35 x 60 feet and 25 x 120 feet, respectively, while the third structure will be one story, 32 x 45 feet.

HARTFORD, CONN.—The Terry Steam Turbine Co. will build a brick and steel fireproof, 1-story, 235 x 40-foot and 255 x 20-foot addition to its plant.

NEW BRITAIN, CONN.—Barney Miller will build a brick, mill construction, 1-story, 89 x 64-foot storage warehouse to cost $20,000 on Stanley street.

NORWICH, CONN.—Plans are being drawn for a 6-story, 40 x 60-foot addition to the mill of the Norwich Woolen Co.

STAMFORD, CONN.—The Waterside Mills will build a two-story addition for storage purposes.

WATERBURY, CONN.—The Clark Bolt & Nut Co. will soon start work on an addition to its plant. The proposed extension will be one story, 46 x 57 feet.

Government Inquiries

Bids on the following equipment are desired by the navy department, bureau of supplies and accounts:

One grinding machine, 4586½, June 10, Washington.

Sensitive drills, 4587½, June 10, Washington.

One plate cutting machine, 4595½, June 10, Washington.

Four drills, 4596½, June 10, Washington.

Six engine lathes, 4604½, June 10, Washington.

Six sensitive drills, 4606½, June 10, Washington.

Two vertical tapping machines, 4607½, June 10, Washington.

One crank shaper machine, 4611½, June 10, Washington.

One vertical shaping machine, 4615½, June 11, Washington.

Three bench milling machines, 4617½, June 11, Washington.

One power press, 4618½, June 11, Washington.

Two drilling machines, 4620½, June 11, Washington.

Schedule numbers, dates of opening and places of delivery follow the specifications of the tools.

Along the Middle Atlantic Seaboard

BROOKLYN, N. Y.—The Bay Ridge Dock Co. has filed plans for a $375,000 plant. According to plans by Architect William Hagginson, 21 Park Row, New York, the structure will be four stories high, 149 x 307 feet.

BROOKLYN, N. Y.—It is reported that a large shipbuilding plant will be erected on property known as the Palmer Docks and recently purchased by the Greenpoint Improvement Co.

NEW YORK.—The Randsberg Iron Works has purchased the 9-acre tract on the East river, and plans to erect a $1,000,000 dry dock.

ALTOONA, PA.—The Pennsylvania railroad is considering a big addition to its shops here.

CONNELLSVILLE, PA. — The Capstan Glass Co. ,this city, has bought the plant of Ripley & Co. will make extensive improvements.

CONNEAUTVILLE, PA. — The Burke Electric Co., Erie, Pa., has bought 25 acres here and will build a branch plant.

FORT WASHINGTON, PA. — Columbia Chemical Co. will build an addition to its plant this summer.

PITTSBURGH.—W. E. Moore & Co., Union Bank building have plans for a plant 60 x 200 and 125 x 145 feet, for the Gas Tank Recharging Co., Keokuk, Iowa, and have let contract to the Worden-Allen Co., Chicago.

POTTSVILLE, PA.—The Industrial Foundry Co. has broken ground for a 1-story foundry, 90 x 120 feet, to cost $30,000.

SHARON, PA.—It is believed that the

A defective casting can make hours of the finest sort of machine work look sick.

Good, reliable and dependable steel castings means fewer shutdowns for repairs—and greatly reduced upkeep.

Many motor car and truck manufacturers—and in fact all concerns that have ever used "Farrell-Cheek" Steel Castings, strongly recommend them as being absolutely reliable in every respect. They are quality castings through and through.

Just a line from you on your requirements will bring a quotation and dependable delivery date —send us the line.

We specialize on Small Steel Castings; Blank Gears; Carbonizing and Case Hardening Boxes.

Farrell-Cheek Steel Foundry Co.

Sandusky, Ohio

Say you saw it in THE IRON TRADE REVIEW

Savage Arms Corp. is planning extensive additions to its plant.

BOUND BROOK, N. J.—The Calco Chemical Co., 233 Broadway, New York, will make additions to its plant here, costing $280,000.

HARRISON, N. J.—The General Electric Co. will erect a producer house, one and three stories, 50 x 100 feet, at its works in this city. Edward M. Waldon, 665 Broad street, Newark, N. J., will be in charge of construction.

NEWARK, N. J.—The Pierce, Butler & Pierce Mfg. Corp., manufacturer of boilers, radiators and plumbing supplies, has purchased a 50 x 200-foot plot which will be improved by a 1-story factory building.

NEWARK, N. J.—The National Oil & Supply Co. has bought additional property here and plans the erection of an addition.

NEWARK, N. J.—The Essex Foundry Co. has had plans prepared for the erection of a 1-story brick addition, 41 x 75 feet.

POMPTON LAKES, N. J. — A $45,000 hydro electric plant will be erected by this borough. S. Firestone, Rochester, N. Y., is drawing plans.

TRENTON, N. J.—The Trenton Malleable Iron Co. will start work shortly on the construction of a $10,000 foundry addition, 44 x 117 feet.

Activities in the Central States

AURORA, ILL.—The Lyon Metallic Mfg. Co., Chicago, will build an addition to its Aurora plant, 1-story, 100 x 140 feet, to cost $50,000.

BLACK RIVER FALLS, WIS.—The Jackson county board of supervisors has accepted plans and specifications by W. C. Neatow, LaCrosse, Wis., for two 75-foot reinforced concrete and steel bridges, subject to the approval of the government.

CHETEK, WIS.—The board of education has authorized employment of an architect to prepare plans for a new high school building, containing gymnasium, auditorium, manual training and domestic science rooms and shops, steam heating system, costing $75,000.

CHICAGO.—The Bunting Boiler Co., John T. Bunting president, 4341 Lowell avenue, will build a boiler shop, 70 x 200 feet, to cost $30,000. L. M. Mitchessl, 19 South La Salle street, is architect.

CLINTONVILLE, WIS.—J. A. Perkins, clerk of the board of education, is taking bids for the erection of a new high school, planned by Architects Parkinson & Dockendorff, LaCrosse, Wis. It will cost about $100,000.

GREEN BAY, WIS.—The Morley-Murphy Hardware Co. sustained a loss of $75,000 by fire in its warehouses. Plans are being prepared by Architects Foeller & Schober for reconstruction of the group and erection of additions.

MANITOWOC, WIS. — Architect Stanley F. Kadow, 988 Kinnickinnic avenue, Milwaukee, is preparing plans for a $100,000 hotel building to be erected in Manitowoc by John M. Kadow. It will be 4-story and basement, 40 x 125 feet.

MANITOWOC, WIS.—Albert C. Tomcheck, contractor, Manitowoc, has taken the contract for building a new county jail and sheriff's residence at Manistique, Mich., at $45,000.

MENASHA, WIS.—Plans are being prepared by city engineer for proposed new $50,000 bridge over the Fox river, to be built this year. The bridge will be of reinforced concrete and steel, with stationary spans.

MILWAUKEE.—Architect Frank E. Gray, 86 Michigan street, has awarded contracts for erection of a foundry, cupola and core room building, costing $65,000, for the Universal Machinery Co., Milwaukee. The building will be 90 x 160 feet, one story, and 35 x 166 feet, two stories. Steel work has been let to Lakeside Bridge & Steel Co., North Milwaukee.

MILWAUKEE.—Albert C. Downing, 787 Shepard avenue, formerly of the Hummel & Downing Co., paper box and boxboard manufacturer, Milwaukee, is organizing a new company to engage in a similar line of business. An initial investment of $100,000 in plant and equipment is contemplated.

MILWAUKEE.—Klug & Smith, consulting engineers, have completed plans for a new bridge over the Sheboygan river, Sheboygan, Wis., to cost $60,000. It will contain one lift and one stationary span, with steel and concrete superstructures, respectively. C. U. Boley is city engineer.

MILWAUKEE.—The Universal Machinery Co., 784 Thirtieth street, manufacturer of machine tools, will build and furnish a machine shop group on Sixty-fourth avenue, to cost $250,000, including a 10-ton crane and several smaller cranes. E. C. Devlin is president.

MILWAUKEE.—Paul Riesen & Sons, Milwaukee, are low bidders at $147,373 for the general contract for erection of superstructure of the first unit of the new Central Continuation school. For the steel and iron work. A. F. Wagner is low bidder at $6094.

MILWAUKEE.—F. Ramstack and Harry Herz have organized the J. E. F. Spark Plug Co., Ltd., with a capital stock of $6500 to manufacture spark plugs and other automobile and tractor accessories.

MILWAUKEE.—The Allen-Bradley Co., 495 Clinton street, manufacturer of electric control apparatus, will build a 2-story addition, 50 x 100 feet. A. C. Eschweiler, Goldsmith building, is architect.

MILWAUKEE.—The Milwaukee Stamping Co. has awarded contracts for construction of a reinforced concrete and steel sash factory and warehouse addition, 100 x 126 feet, 3-story and basement.

MILWAUKEE.—The National Steel Foundries will start construction shortly on an addition, 80 x 140 feet. Richard P. Tell is president and general manager.

MILWAUKEE.—The Standard Crucible Steel Co. will build a foundry, 123 x 422 feet at Thirtieth and Lloyd streets.

MODENA, WIS.—Casper Schmidlin has engaged the Power Engineering Co., Corn Exchange, Minneapolis, to prepare plans for extensive improvements in his hydroelectric and milling plant.

OSHKOSH, WIS.—Sealed bids will be advertised for by the board of public works for furnishing and installing a 4,500,000-gallon pumping engine, motor-driven, with automatic control, for the city waterworks system.

PLAINFIELD, WIS.—Spees & Reed have taken the general contract for erecting a public garage and machine shop, 80 x 53 feet, for J. F. Walter & Fields.

QUINCY, ILL.—The Moorman Mfg. Co., E. W. Moorman president, will build a 2-story addition, 50 x 146 feet, to cost $30,000.

RACINE, WIS.—The Perfex Radiator Co. has reorganized and increased its capital stock from $15,000 to $1,000,000. Plans are being made for building extensions to the new plant erected a short time ago. Fred Opits is president and general manager.

RIB LAKE, WIS.—The Rib Lake Lumber Co. is building a machine and repair shop costing $15,000.

STEVENS POINT, WIS.—The First National bank, this city, will erect a modern bank building.

SUPERIOR, WIS.—The Douglas county board of supervisors has taken bids for the construction of the proposed new $400,000 courthouse, county jail and sheriff's residence, subject to the wishes of the government.

SUPERIOR, WIS.—The Continental Motor Truck Co. is installing equipment in its new plant and will begin production of trucks in a short time. J. G. Barnesdale is chief engineer.

SUPERIOR, WIS.—The Enterprise Foundry Co. has been organized by S. A. Riches and associates and is establishing a gray iron and malleable works.

WATERTOWN, WIS. — The Monarch Tractor Co. is making additions to its machine shop and assembling room and will also build an addition to its foundry. F. L. Thomas is secretary and treasurer.

WEST BEND, WIS.—The West Bend Woolen Mills and the Barton Roller Mills will rebuild their power dams on the Milwaukee river. John Geib is owner of the woolen mills and W. F. Gadow of the flour mills.

WHITEFISH BAY, WIS. — The village board of trustees has engaged Architects Martin Tullgren & Sons to design a new public school building, with eight classrooms, auditorium, gymnasium and manual training shops. The building is estimated to cost $75,000. W. J. Eisenring is secretary.

DETROIT.—Machinery and equipment of the Detroit-Wyandotte Motor Co. has been sold by the Security Trust Co., trustee, to Samuel L. Winternitz, of Chicago, and the New Jersey Machine Co., of Newark. The equipment probably will be offered for sale.

DETROIT.—The A. Colton Co., 782 Jefferson avenue, manufacturer of machinery, will build a 1-story machine shop addition, 60 x 153 feet. Mildner & Eisen, 924 Hammond building, are architects.

DETROIT.—The Kelsey Wheel Co., Military road, is building a 1-story addition, 80 x 140 feet, to cost $20,000.

DETROIT.—The Aluminum Castings Co is building a 1-story acetylene gas plant.

ALTON, ILL.—The Consolidated Chemical Products Co., care I. W. Brandels, will build

To Build Economically Under Present Conditions Requires Unusual Engineering and Construction Experience

The Arnold Organization offers to prospective builders of industrial plants, advice and service which will effect decided savings in their building operations. Today's unprecedented restrictions in the choice of building materials, and in the supply of labor, make the need of Arnold Service even more important than in the past.

Economy in cost and certainty of completion in time specified are assured by Arnold Methods. The wide clientele which we have served for more than 20 years, includes such well-known concerns as:

Aermotor Company
Bucyrus Company
Diesel Engine Company
International Harvester Co.
The Pullman Company
Walker Manufacturing Co.
Amer. Brake Shoe & Foundry
W. B. Conkey Company
Hurley Machine Company
Otis Elevator Co.
Quaker Oats Company
Cleveland-Cliffs Iron Co.

Among Arnold Clients there is a uniformity of satisfaction that bears witness to prompt efficient service they have received. Such results were made possible through centralizing the entire responsibility in one organization, broad enough to handle properly every detail from the making of the plans to the final installation of machinery and equipment.

Let us solve your Building Problems—Write us

THE ARNOLD COMPANY

ENGINEERS—CONSTRUCTORS

ELECTRICAL—CIVIL—MECHANICAL

105 SOUTH LA SALLE STREET : CHICAGO

ENGINEER - CONSTRUCT - TO ENDURE -

In this construction, ground was broken immediately upon completion of general plans. Details were complete as construction proceeded. Every part of the work was done on a previously prepared schedule and the building completed with a saving of time that meant thousands of dollars to the owners.

This new plant of a large manufacturing company was put up in the face of the most unfavorable material and labor conditions. It is under conditions such as these that through centralizing responsibility in The Arnold Company, seemingly impossible problems are solved.

a 2-story factory, 90 x 150 feet, to cost $100,000.

BRADLEY, ILL. — The David Bradley Mfg. Co., owned by Sears, Roebuck & Co., Chicago, will build a malleable foundry. J. C. Bohner is manager.

CHICAGO.—The Electric Steel Co., Thirty-first and Wood streets, has under construction a foundry building, 130 x 300 feet, a materials yard with a craneway, 48 x 360 feet, and a reclamation mixing and distributing system for handling molding sand. Design and construction are by Frank D. Chase, Inc., Peoples Gas building, Chicago.

CHICAGO.—The Haggard & Marcussen Co., manufacturer of spring beds, 1109 West Thirty-seventh street, is building a 1-story addition, 49 x 70 feet. J. C. Llewellyn, 38 South Dearborn street, is architect.

CHICAGO.—The Groen Mfg. Co., 2113 North Kenneth avenue, coppersmiths, will build a 1-story factory, 50 x 100 feet. T. J. Reynertson, 1937 North Crawford avenue, is architect.

CHICAGO. — A. F. Dagling, 6327 St. Lawrence avenue, is building a 1-story machine shop, 96 x 100 feet, at 905 West Nineteenth street.

MATTOON, ILL.—The Chuse Engine & Mfg. Co., 1320 Prairie avenue, has increased its capital and bought a site adjoining its plant on which it will build a foundry and machine shop. H. A. Chuse is general manager.

ANDERSON, IND.—The Hill Pump Co. is building a foundry, 100 x 200 feet, to cost $45,000.

ATTICA, IND.—The Attica Electric Power Co., B. H. Freeland superintendent, will build a waterworks and electric light plant, to cost $100,000.

FRANKFORT, IND.—Bids will be asked within the next few weeks for the construction of new shops for the Toledo, St. Louis & Western railroad, to cost $200,000. Plans now are being prepared.

MARYLAND, IND.—The Evansville Tool Co., Frank Loloff president, Ninth avenue and Maryland street, Evansville, will build a 1-story power house, 45 x 65 feet at Maryland.

SOUTH BEND, IND. — The Malleable Steel Range Co. is building an addition, 34 x 88 feet, to cost $10,000.

VALPARAISO, IND.—The Indian Steel Products Co. is building an addition.

CINCINNATI. — The Cincinnati-Bickford Tool Co. is installing machinery in an addition to its plant in Oakley that will increase its present capacity nearly 50 per cent.

CINCINNATI.—The Cincinnati Pulley Machinery Co. is building an addition to its plant in Covington, Ky.

WEST UNION, O.—W. E. Caldwell, of the Hillsboro Overall Co., is arranging for improving and enlarging the plant here.

YOUNGSTOWN, O.—The Truscon Steel Co., is erecting a shop addition of 12,000 square feet.

COVINGTON, KY. — The United States Motor Truck Co. is building a 3-story plant, 75 x 175 feet, to cost $75,000.

LOUISVILLE, KY.—J. B. Speed & Co. will erect a potash plant at Lockland, Ky., at a cost of $100,000.

OWENSBORO, KY. — The Owensboro Forging Co., Henry S. Barry, president, will proceed at once to rebuild its shop, recently burned.

Western and Intermountain Territory

ROCHESTER, MINN.—J. O. Thompson, 118 Broadway, will build a 2-story machine shop, 66 x 140 feet, to cost $35,000. F. H. Morse & Co., Leland block, is architect.

ST. PAUL.—The American Hoist & Derrick Co., Water and Roberts streets, is building a 1-story machine shop, 40 x 74 feet, to cost $20,000.

DAVENPORT, IOWA.—The Scott County Savings bank has let the contract for a new bank building to cost $250,000.

FORT MADISON, IOWA.—The Karamoid Mfg. Co. is building a 3-story addition, 50 x 250 feet, to cost $20,000, part of which will be used as a machine shop.

WINTERSET, IOWA.—The Citizens National bank has let the contract for a new bank building.

ST. JOSEPH, MO.—The Berry Steel & Iron Co., G. D. Berry, president, Fifth and Oak streets, will build a plant, 270 x 360 feet.

LITTLE ROCK, ARK.—The C. J. Snyder Co., 114 Arch street, is inquiring for equipment for its machine and repair shop.

BAXTER SPRINGS, KANS. — Citizens have voted a bond issue of $85,000 for waterworks plant construction.

EL DORADO, KANS.—Citizens have voted a bond issue of $60,000 for waterworks extensions.

OMAHA, NEBR. — The Auto Pump & Mfg. Co., 729 First National Bank building, is building two additions, 80 x 240 feet and 40 x 80 feet.

LIBBY, MONT. — The Great Northern railroad will begin construction of 10 new passing sidetracks between Troy and Whitefish.

MISSOULA, MONT.—The Northern Pacific railroad is to start at once construction of a double track in Missoula to eliminate a delay in switching and handling freight. This and other work will cost $19,000.

COPPERFIELD, NEV.—A forge shop, engine shop and compressor works will be erected by the Washoe Copper Co. at its plant near here.

RENO, NEV.—The Lang Iron Reduction Co., capitalized at $30,000, has been chartered to operate a small plant, by Herbert Lang, J. H. Scales and Irving Peterson.

Up and Down the Pacific Coast

EVERETT, WASH.—The United Steel Co. is to start at once on the erection of its buildings here, and bids are being received from Everett contractors. The main building is to be 70 x 200 feet, 32 feet high. J. Johnson, general manager, states that all necessary machinery has been provided for.

SEATTLE.—The Western Drop Forge Co., 301 Horton street, Seattle, will erect an addition, 180 x 165 feet. Four additional hammers and presses are being installed. A die sinking room also is being constructed.

SEATTLE.—The city has asked the capital issues commission, Washington, to grant permission to issue bonds for $5,000,000, proceeds to be used for a power plant for the city, probably on the Skagit river.

SEATTLE.—Contracts are to be awarded shortly by the Centenial Mill Co. for an 8-story flour mill, warehouse and office building. Plans are practically completed. Cost will be $400,000.

SEATTLE. — The Gulowsen-Grei Engine Co. will build a plant, 174 x 300 feet, costing $400,000, on Salmon Bay. S. E. Sonnichsen, Downs block, is architect.

SEATTLE.—The Heffernan Engine Works will erect a 175 x 50-foot machine shop, to cost $25,000. Hull Building Co., 1510 Jefferson street, has the contract.

SEATTLE.—An ordinance has been passed by the city council authorizing appropriation of $100,000 for municipal railroad construction from the bond fund.

SEATTLE.—The American Foundry Co., 408 Occidental avenue, has obtained a site and will build a foundry of 20 tons a day capacity.

SEATTLE.—The Hefferman Engine Works is building a 2-story machine shop, 50 x 174 feet, to cost $25,000.

TACOMA, WASH.—Pacific Coast Managers of the Foundation Co., L. C. Smith building, Seattle, announce plans for constructing a new unit to the local yards for steel ship construction and numerous other buildings are under consideration.

ASTORIA, OREG.—The Hammond Lumber Co. will install electric power equipment, including a turbine and generator, of 2000 horsepower capacity, and four 600-horsepower water-tube boilers.

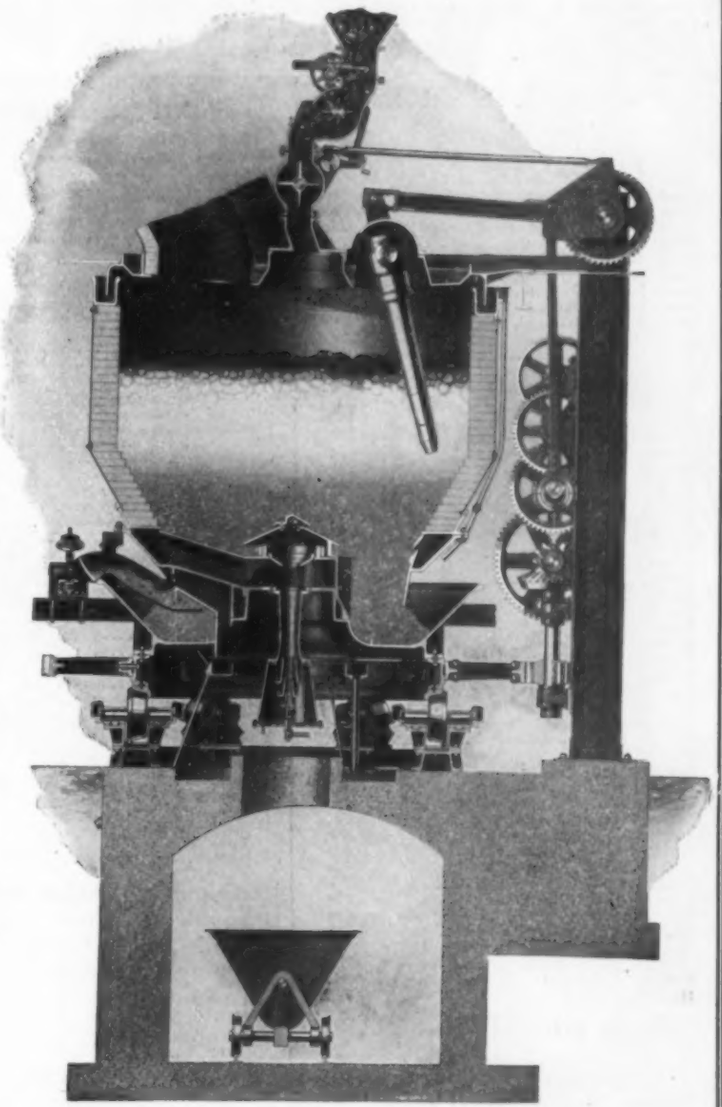
The Hughes Mechanical Gas Producer

REPEAT ORDERS
Indicate Satisfaction

A partial list of repeat customers showing number of Hughes Producers used by each.

Carnegie Steel Co.	119
American Steel & Wire Co.	56
Bethlehem Steel Co.	54
New Jersey Zinc Co.	42
National Tube Co.	41
Jones & Laughlin Steel Co.	40
Lackawanna Steel Co.	39
Indiana Steel Co.	38
Inland Steel Co.	36
Minnesota Steel Co.	36
Pittsburgh Steel Co.	36
American Sheet & Tin Plate Co.	32
Republic Iron & Steel Co.	32
American Rolling Mill Co.	30
Corrigan, McKinney & Co.	30

More than 1000 in use



Write for Bulletin A-4

Bulletin A-4 contains considerable information on the subject of producer gas and explains the Hughes Uniform Feed, Water Cooled Poker, Blowing, Mixing and other special features which contribute to its splendid performance. A copy is waiting your request.

THE WELLMAN-SEAVER-MORGAN CO.

CLEVELAND, OHIO, U. S. A.

Iron and Steel Prices

Corrected to Tuesday Noon

IRON ORE

Superior Ores, Per Ton, Lower Lake Ports	
Old range Bessemer, 55 iron	$5.95
Mesabi Bessemer, 55 iron	5.70
Old range non-Bess., 51½ iron	5.20
Mesabi non-Bess., 51½ iron	5.05

WAREHOUSE PRICES

Steel bars, Chicago	4.10c
Steel bars, Cleveland	4.035c
Steel bars, Detroit	4.085c
Steel bars, Philadelphia	4.10c
Steel bars, New York	4.095c
Steel bars, St. Louis	4.17c
Steel bars, Cincinnati	4.085c
Steel bars, St. Paul	4.22c
Steel bars, Buffalo	4.05c
Iron bars, Buffalo	4.65c
Iron bars, Chicago	4.10c
Iron bars, Cleveland	3.985c
Iron bars, Detroit	4.75c
Iron bars, St. Louis	4.17c
Iron bars, Cincinnati	4.085c
Iron bars, Philadelphia	4.50c
Iron bars, New York	4.659c
Shapes, Chicago	4.20c
Shapes, Detroit	4.185c
Shapes, St. Louis	4.27c
Shapes, St. Paul	4.32c
Shapes, New York	4.195c
Shapes, Cleveland	4.135c
Shapes, Philadelphia	4.20c
Shapes, Buffalo	4.15c
Shapes, Cincinnati	4.185c
Plates, Buffalo	4.40c
Plates, Chicago	4.45c
Plates, Detroit	4.435c
Plates, St. Louis	4.52c
Plates, St. Paul	4.57c
Plates, New York	4.445c
Plates, Cleveland	4.385c
Plates, Philadelphia	4.45c
Plates, Cincinnati	4.435c
No. 10 blue anl. sheets, Chi.	5.45c
No. 10 blue anl. sheets, C'eve.	5.385c
No. 10 blue anl., Buffalo	5.40c
No. 10 blue anl., sheets, St. L.	5.52c
No. 10 blue anl. sheets, Cinci.	5.435c
No. 10 blue anl. sheets, St. Paul	5.57c
No. 10 blue anl. sh., Detroit	5.435c
No. 28 black sheets, Chgo.	6.45c
No. 28 black sheets, Cleve.	6.385c
No. 28 black sheets, Cinci.	5.45c
No. 28 black, Detroit	6.435c
No. 28 black sheets, St. L.	6.52c
No. 28 black sheets, St. Paul	6.57c
No. 28 galv. sheets, Chgo.	7.70c
No. 28 galv. sheets, Cleve.	7.635c
No. 28 galv. sheets, Cinci.	6.635c
No. 28 galvanized, Detroit	7.685c
No. 28 galv. sheets, St. L.	7.77c
Hoops, Cleveland	4.885c
Hoops, Detroit	4.935c

IRON AND STEEL SCRAP

(Prices in Gross Tons)

STEEL WORKS USE

Bundled sheets, Cincinnati	$22.50 to 23.00
Bundled sheets, Pittsburgh	22.00
Bundled sheets, Cleveland	23.50 to 24.25
Bundled sheets, Buffalo	24.00 to 25.00
Boiler plate, cut, No. 1, Chg.	24.50 to 25.50
Boiler plate, cut No. 1, St. L.	25.50 to 26.00
Frogs, switches, guards, St. L.	28.50 to 29.00
Frogs, switches, guards, Chgo.	29.00
Heavy melting steel, Pitts.	29.00
Heavy melting steel, Buffalo	30.00
Heavy melting steel, Chgo.	29.00
Heavy melt'g steel, Cleveland	29.00
Heavy melting steel, Cinci.	27.50 to 28.00
Heavy melt'g steel, east. Pa.	28.00 to 29.00
Heavy melting steel, N. Y.	26.75
Heavy melting steel, St. L.	27.50 to 28.00
Heavy melt'g steel, Birming.	22.50 to 24.00
Hydraulic press. sheets, Cleve.	28.50 to 29.00
Hydraulic press. sheets, Pitts.	26.00
Hydraulic press. sheets, Chgo.	26.00 to 26.50
Knuckles, couplers, Chgo.	34.00
Knuckles, coup., St. Louis	32.50 to 33.00
Low phos. steel, Buffalo	37.50
Low phos. steel, Pittsburgh	39.00
Low phos. crops eastern Pa.	39.00
Low phos. quar. & east. Pa.	36.50
Shoveling steel, Chicago	28.00 to 28.50
Shoveling steel, St. Louis	26.50 to 27.00
Springs, Chgo.	34.00
Steel rails, short, Chicago	34.00
Steel rails, short, Cleveland	34.00
Steel rails, short, St. Louis	30.75 to 31.25
Steel rails, old, Birmingham	24.00 to 25.00
Stove plate, Chgo.	25.50 to 26.50
Stove plate, Cincinnati	20.50 to 21.00
Stove plate, St. Louis	22.50 to 23.00
Stove plate, N. J. points	24.75
Stove plate, Birmingham	20.00 to 22.00
Stove plate, Buffalo	24.00 to 25.00
Stove plate, eastern Pa.	24.00 to 25.00
Stove plate, Cleveland	25.00 to 25.50
Stove plate, Pittsburgh	22.00

Freight Rates, Pig Iron

Mahoning and Shenango valleys to:	
Cleveland	$1.10
Newark, N. J.	3.50
Boston	3.70
Philadelphia	3.30
Pittsburgh	1.10
St. Louis	3.70
Minneapolis, St. Paul	4.54
Buffalo to:	
Albany, N. Y.	$1.40
New England (rail)	3.10
New York and Brooklyn (rail)	3.10
Virginia furnaces to:	
Philadelphia	$3.27
New England	3.77
Brooklyn, Jersey City, Newark	3.52
Birmingham, Ala., to:	
Boston	6.00
Cincinnati	2.90
Chicago	4.00
Cleveland	4.00
Louisville, Ky.	2.65
Minneapolis, St. Paul	5.85
New York (r. and w.)	6.00
Philadelphia (r. and w.)	5.25
Pittsburgh	4.90
Savannah, Ga.	2.75
St. Louis	3.40
Chicago to:	
Des Moines	$2.80
Minneapolis, St. Paul	2.00
Milwaukee	.50
Moline, Ill.	1.15
Omaha	3.58
St. Louis	1.58
Ironton and Jackson, O., to:	
Chicago	$3.00
Cincinnati	1.40
Cleveland	1.90
Detroit	2.10
Indianapolis	1.80
Minneapolis, St. Paul	4.54
Duluth, Minn., to:	
Minneapolis, St. Paul	$1.25
Mayville, Wis.:	
Minneapolis-St. Paul	$1.75

Freight Rates, Finished Material

Pittsburgh, carloads, per 100 lbs., to:	
New York	19.5 cents
Philadelphia	18.5 cents
Boston	21.5 cents
Buffalo	17.0 cents
Baltimore	18.0 cents
Cleveland	13.5 cents
Cincinnati	18.5 cents
Chicago	21.5 cents
Detroit	18.5 cents
Minneapolis and St. Paul	32.9 cents
Denver	82.5 cents
St. Louis	27.0 cents
New Orleans	30.7 cents
Birmingham	45.0 cents
Pacific coast (all rail)	$1.00
Pacific coast (tin plate)	1.00

IRON MILL USE

Angle bars, iron, Chgo.	39.00
Angle bars, steel, St. Louis	30.50 to 30.50
Angle splice bars, St. Louis (iron)	37.50 to 38.00
Arch bars, transoms, Chgo.	44.00 to 45.00
Arch bars and transoms, St. Louis	45.00 to 45.50
Busheling, No. 1, Cleveland	29.00 to 30.00
Busheling, No. 1, Buffalo	29.00 to 30.00
Busheling, No. 2, Buffalo	21.00 to 23.00
Busheling, No. 1, Pittsburgh	32.00
Busheling, No. 1, Cincinnati	25.00 to 25.50
Busheling, No. 1, Chgo.	29.00 to 29.50
Busheling, No. 2, Chgo.	19.00 to 20.00
Busheling, No. 1, St. Louis	27.00 to 27.50
Cast borings, New York	16.50 to 17.50
Cast borings, eastern Pa.	19.00
Cast borings, Buffalo	18.00 to 19.00
Cast borings, Cleveland	18.25 to 18.50
Cast borings, Cincinnati	15.50 to 16.00
Cast borings, Pittsburgh	19.00
Cast borings, Birmingham	12.00 to 12.50
Cast borings, Chgo.	17.75 to 18.25
Cast borings, St. Louis	16.50 to 17.00
City wrought, long, N. Y.	31.00
Cut forge, Chgo.	31.00 to 31.50
Forge flashings, small, Cleve.	27.00 to 27.50
Forge flashings, large, Cleve.	27.00 to 27.50
Forge No. 1, eastern Pa.	26.50 to 27.50
Grate bars, Buffalo	24.50 to 25.00
Grate bars, Cleveland	25.50 to 26.00
Grate bars, N. J. points	24.75
Iron axles, Pittsburgh	46.50
Iron axles, Cincinnati	43.50 to 44.00
Iron axles, Cleveland	46.50
Iron axles, Chicago	46.50
Iron axles, eastern Pa.	46.50
Iron axles, St. Louis	46.00 to 46.50
Iron axles, Buffalo	45.00 to 47.00
Iron rails, Chicago	39.00
Iron rails, Buffalo	36.00 to 37.00
Iron rails, Cincinnati	34.00 to 35.00
Iron rails, St. Louis	36.00 to 36.50
Iron rails, Cleveland	34.00
Machine turnings, Cincinnati	16.00 to 16.50
Machine turnings, Cleve.	18.00 to 18.25
Machine turnings, Buffalo	17.00 to 17.50
Machine turnings, N. Y.	16.00 to 16.50
Machine turnings, Pitts.	18.00 to 19.00
Machine turnings, east. Pa.	18.50 to 19.00
Machine turnings, Birming.	17.00 to 17.50
Machine turnings, Chicago	17.75 to 18.25
Machine shop turnings, St. L.	17.50 to 18.00
Pipes and flues, Cleveland	24.50 to 25.50
Pipes and flues, Chicago	26.50 to 27.00
Pipes and flues, St. Louis	26.25 to 26.75
R. R. mch. cast, No. 1, Buff.	34.00
R. R. wrgt. No. 1, Buffalo	34.00
R. R. wrgt., No. 1, east Pa.	34.00
Railroad wrgt. No. 1 Cinci.	33.50 to 34.00
Railroad wrgt., No. 1, Cleve.	34.00
R. R. wrought, No. 1, Pitts.	34.00
Railroad wrgt., No. 2, Chgo.	31.00 to 31.50
Railroad wr'ght, No. 1, Chgo.	33.50 to 34.00
R. R. wrgt. No. 1, Birming.	25.00 to 27.00
No. 1 yard wrought East Pa.	33.00
No. 1 busheling wrgt., E. Pa.	31.00
Sheet wrought, Pittsburgh	34.00
Railroad wrgt., No. 1, St. L.	33.00 to 35.50
Railroad wrgt., No. 2	31.25 to 31.75
Wrought pipe, Buffalo	27.00 to 28.00
Wrought pipe, eastern Pa.	31.50 to 32.00
Wrought pipe, ungraded, eastern Pa.	29.00

IRON OR STEEL WORKS USE

Axle turnings, Cleveland	$24.00
Axle turnings, Buffalo	24.00
Heavy axle turn'gs, E. Pa.	24.00
Heavy axle turnings, Pitts.	25.00
Shafting, New York	35.50
Shafting, eastern Pa.	39.00
Steel car axles, Pittsburgh	46.50
Steel car axles, Birmingham	30.00 to 32.00
Steel car axles, New York	43.00
Steel car axles, Buffalo	44.00 to 46.00
Steel car axles, Cleveland	44.00
Steel car axles, eastern Pa.	46.50
Steel car axles, Chgo.	46.50
Shafting, St. Louis	36.50 to 37.00
Steel car axles, St. Louis	46.00 to 46.50

IRON FOUNDRY USE

Car wheels, (iron), Pitts.	$29.00
Car wheels, (steel), Pitts.	34.00 to 35.00
Car wheels, eastern Pa.	29.00
Car wheels, Buffalo	29.00
Car wheels, Chicago	29.00
Car wheels, St. Louis	28.50 to 29.00
Car wheels, Birmingham	25.00 to 27.00
Car wheels, Cleveland	30.00
Tram car wheels, Birming.	21.50 to 24.00
Cast, No. 1, cupola east. Pa.	33.00
Cast, No. 1, Birmingham	23.00 to 25.00
Cast No. 1, Cleveland	31.00 to 31.50
Cast, No. 1, Cincinnati	31.50 to 32.00
Cast, 1, heavy, N. J. points	32.25 to 32.75
Cast, 1, machy., N. J. points	32.50 to 32.75
Cast, No. 1, Chicago	30.50 to 31.00
Cast, No. 1, Pittsburgh	32.50 to 33.00
Cast, No. 1, St. Louis	26.50 to 29.00
Malleable, Cincinnati	30.00 to 34.00
Malleable, Cleveland	30.00 to 34.00
Malleable, Buffalo	29.00 to 34.00
Malleable, Pittsburgh	33.00 to 34.00
Malleable, east. Pa.	29.00
Malleable, cupola, East Pa.	33.00
Malleable railroad, Chgo.	32.00 to 33.00
Malleable, agricultural, Chgo.	31.75 to 32.25
Malleable railroad, St. Louis	28.50 to 29.00
Malleable agricultural, St. L.	27.25 to 27.75

MISCELLANEOUS USES

Boiler punchings, Chgo.	35.00 to 35.50
Reroll. rails, 5 ft. & ov., Pitts.	34.00
Reroll. rails, 5 ft. & ov., Chgo.	34.00
Reroll. rails, 5 ft. & ov., E. Pa.	34.00
Reroll. rails, 5 ft. & ov., St. L.	33.50 to 34.00
Reroll. rails, 5 ft. or over, Cleve.	34.00
Rerolling rails, long, Birm.	37.50 to 38.50
Locomotive tires, Chgo.	43.00 to 44.00
Locomotive tires, St. Louis	40.50 to 41.00